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TELEPHONE ENGINEER

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The Automatic Gives Quick, Accurate, Convenient Service

The Automatic Reduces the Operating Costs to a Minimum.

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Consultation as to your needs invited.

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Wonder why it is that since the war practically all contracts for new equipments of substantial size have been for AUTOMANUAL.

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Ask Ashtabula
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Ask Galion
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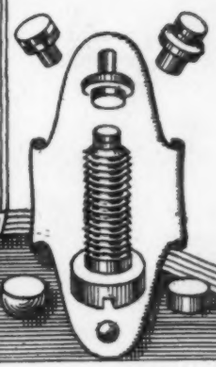

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Refiners and Workers of Platinum Gold and Silver

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The actual cost of a tool depends on the length of time it gives satisfactory service. The purchase price is but one of several factors.

OSHKOSH

Construction Tools

because of their longer life, and because men do more and better work with them, cost less over a period of years. That's why more Oshkosh Construction Tools are sold than of all other makes combined.

Your jobber carries them

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811 Telner Street
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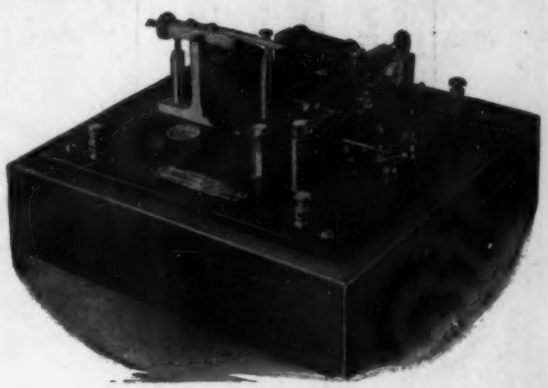
WARNER POLE CHANGERS



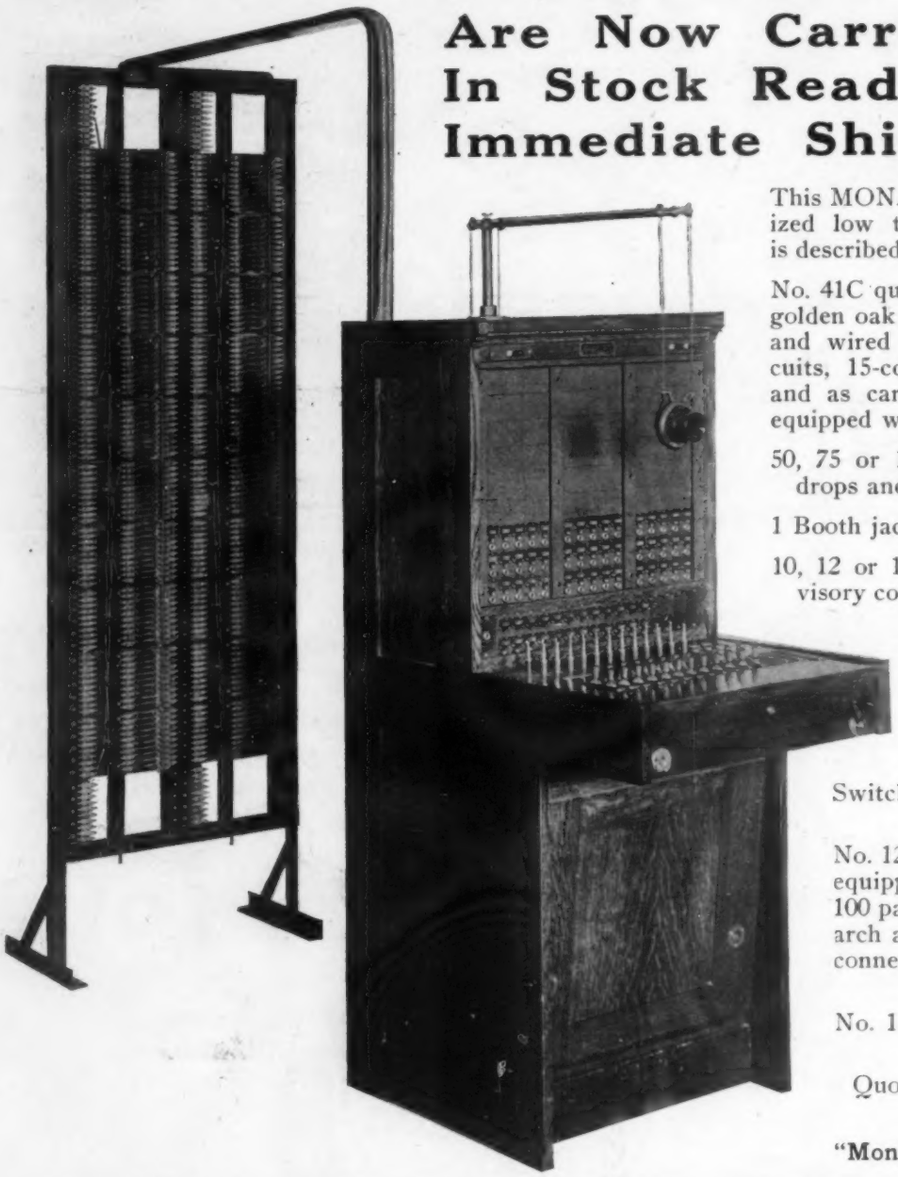
—with an army of users that has grown to well over 25,000 in 20 years.

That's proof of satisfaction!

Are you in the market?

WARNER ELECTRIC CO.
MUNCIE, INDIANA

MONARCH
MAGNETO SWITCHBOARDS
Are Now Carried In Stock Ready For Immediate Shipment



This MONARCH standardized low type switchboard is described as follows:

No. 41C quarter sawed dark golden oak cabinet arranged and wired for 120-line circuits, 15-cord circuits, etc., and as carried in stock, is equipped with:—

50, 75 or 100 self-restoring drops and jacks.

1 Booth jack equipment.

10, 12 or 15 Double Supervisory cord equipments.

3 Repeating coils.

1 Operator's equipment.

1 Night alarm equipment.

Switching Keys, etc.

No. 120 Arrester frame, equipped with 50, 75 or 100 pairs of No. 1 Monarch arrester and cross connecting board.

No. 1 Cable support.

Quotations upon request.

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Monarch Telephone Manufacturing Co.

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Tel-Electric Co., Houston, Texas. Electric Supply Co., New Orleans, La. Coker Electric Supply Co., Los Angeles, Cal.
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MONARCH

MAGNETO TELEPHONES

Are Also Carried In Stock Ready For Immediate Shipment

Code No. 251 Telephone

Orders calling for the following can be shipped without any delay:

No. 234—3 Bar 1000 ohm Compact Type Wall Telephone.
No. 251—5 Bar 1600 ohm Compact Type Wall Telephone.
No. 251C—5 Bar 1600 ohm Compact Wall Telephone, with condenser in receiver circuit.
No. 253—5 Bar 2500 ohm Compact Type Wall Telephone.
No. 253C—5 Bar 2500 ohm Compact Type Wall Telephone, with condenser in receiver circuit.
No. 33 Style 3 Bar 1000 ohm Bridging Desk Telephone.
No. 33 Style 5 Bar 1600 ohm Bridging Desk Telephone.
No. 33C Style 5 Bar 1600 ohm Bridging Desk Telephone, with condenser in receiver circuit.
No. 33 Style 5 Bar 2500 ohm Bridging Desk Telephone.
No. 33C Style 5 Bar 2500 ohm Bridging Desk Telephone, with condenser in receiver circuit.

Monarch telephones can be operated and maintained for less money than any other make, and companies standardizing with Monarch equipment will better service and increase profits.

"Monarch for Service"

Monarch Telephone Manufacturing Co.

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Hendrie & Bolthoff Mfg. Sup. Co., Denver, Colo. Fidelity Electric Co., St. Louis, Mo. Corwin-Abrams Sales Co., Seattle, Wash.

The No. 105 Magneto Switchboard — The *Pion*

Each switchboard is equipped with twelve feet of switchboard cable for making connections with terminal and protector rack. All line cable connections inside of the switchboard are made in our factory.

Adjustable telescopic transmitter arm provides for suspension of transmitter by cords so that vibrations in the central office floor cannot reach the transmitter and produce interference in the operator's telephone circuit.

Push button type locking keys that control operation of night alarm bell and generator circuits.

Unequipped line drop spaces filled with steel drop blanks so that additional drops may be added in groups of five when required.

Oak panels which may be removed to allow increase in wiring and equipment in 50 and 100 line switchboards.

No. 11 Plug-Restoring Drops are sensitive, positive and efficient. Equipped with shutters that show one curved and two flat surfaces when operated so as to give a prominent signal from any angle in front of the switchboard.

Cord circuits equipped with No. 169 Keys providing double supervision. These circuits are absolutely non-ring-thru, sure-ring-off and develop highest transmission efficiency. The first two circuits on left side are "zero-loss" circuits for toll connections.

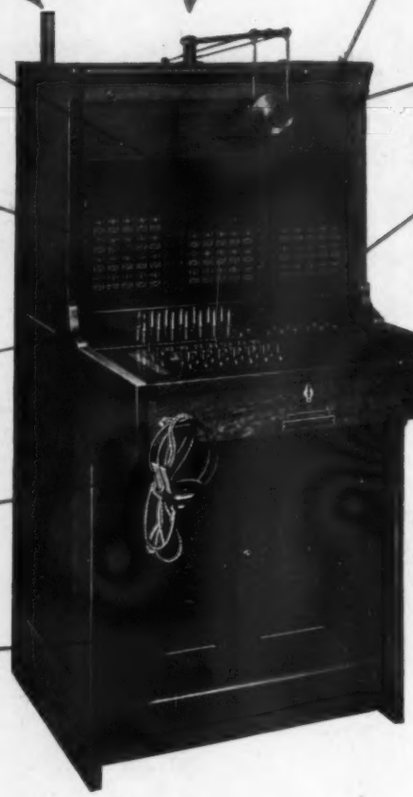
Key shelf and plug-board are drilled for an ultimate capacity of fifteen cord circuits. Unequipped places are neatly covered with apparatus blanks. The entire surface of key-shelf and plug-board are covered with a wear-resisting black insulating material

Powerful five-bar hand generator for signalling. An associated key provides for switching ringing circuits to power driven generator or pole-changer.

Operator's bipolar head receiver is of extreme sensitiveness and efficiency. Fitted with sanitary wire head band, green silk covered flexible cord and detachable plug.

Low keyshelf allows operator to use a chair of ordinary height thus increasing her comfort and lessening her fatigue.

Removable front panel furnishes convenient access to interior of cord compartment.



SUPERVISION FEATURES

Keyboard Supervision.
Automatically Restored Supervision.
Double Supervision.
Positive Supervision.

DIMENSIONS

Height, 4 feet 3 1-8 inches.
Width, 2 feet 1 1-8 inches.
Depth, 2 feet 6 3-16 inches.
Keyboard Height, 31 inches.

The No. 105 Magneto Switchboard grows a position at a time as you need it

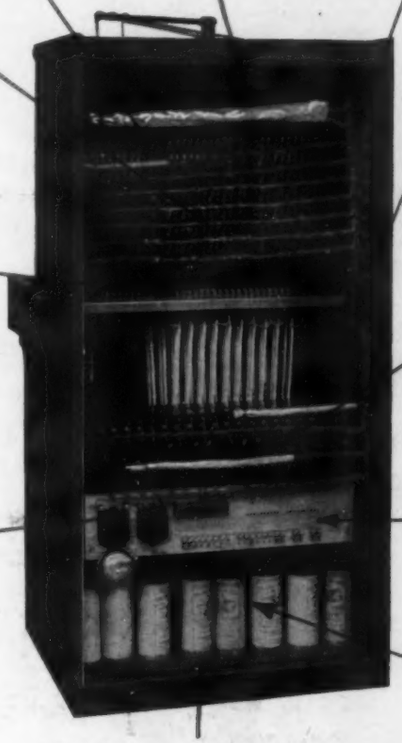
The *Pioneer* Standardized Magneto Switchboard

Structural iron framework provides a strong and rigid mounting for the line drops.

Unequipped line cable wiring wrapped in paper and tied for protection against injury.

Night alarm bell leads to separate horizontal rows of drops are joined to night alarm common wire through test connectors so that each row of drops may be tested for night alarm operation without disturbing other rows.

Terminals of No. 11 Plug-Restoring Drops are easily accessible for inspection. Connections and disconnections can be made without the use of a soldering iron.



Switchboard wiring contained in a single formed and laced cable with the various circuits systematically coded by color code in insulation of the wires.

Cord shelf and cord terminals arranged so that cords may be changed easily and quickly.

High efficiency repeating coils and condensers for cord circuits mounted neatly on a steel plate with all terminals and wiring in plain sight.

Night alarm bell and code signalling buzzer are operated independently of each other.

All terminals for miscellaneous circuits are mounted on this hard maple terminal board and numbered or lettered to aid in installation or testing.

Plenty of space is provided for the installation of operator's and night alarm circuit batteries in the bottom of the switchboard cabinet.

Lift-out type of removable rear panel rests in grooves to prevent entrance of dust to interior of switchboard cabinet.

STANDARD EQUIPMENTS

Code No.	Wired for Lines	Wired for Cords	Equipped with Lines	Equipped with Cords	Shipping Weight
105-A	50	15	30	5	350 Lbs.
105-B	100	15	50	7	400 Lbs.
105-C	150	15	100	10	450 Lbs.

Stromberg-Carlson Telephone Mfg. Company

Rochester, N. Y. Chicago, Ill. Kansas City, Mo. Toronto, Can.

JOBBERS

Midland Electric Co., Regina, Sask.
Charleston Electric Supply Company, Charleston, W. Va.

DISTRIBUTORS

Garnett Young & Co., San Francisco, Cal., Los Angeles, Cal., Portland, Ore., Seattle, Wash.
Scoville Mercantile Co., Atlanta, Ga.

Common Battery for the Small Exchange

Why You Can Afford Better Service

IN A RECENT ISSUE OF TELEPHONE ENGINEER WE SAID THAT THERE WERE 15,000 EXCHANGES TODAY IN THE UNITED STATES, THAT COULD GREATLY IMPROVE THEIR SERVICE BY INSTALLING A KELLOGG SERVICE SWITCHBOARD; THAT THEY COULD MAKE MORE MONEY WITH LESS MAINTENANCE, SMALLER OPERATING FORCE AND WITH GREATER OPERATING ECONOMY.

x x x x x

There is this difference between magneto and common battery service: the common battery type is better service. It is better in exactly the same sense as wool is better than cotton cloth. Exchange managers are handling magneto service with fine results in towns all over the country but the difference in "grade" is just as distinct as in merchandise.

We reiterate the above statement regarding 15,000 exchanges to especially combat the objection so often raised, that common battery service is for the large exchanges of a thousand lines or more. In other words "too expensive for the smaller exchanges."

It is a fact that we have exchanges operating as low as 200 lines in smaller towns that are giving excellent service to subscribers, much to their satisfaction. It is not difficult to convince any fair-minded subscriber that this "better" service is easily worth the slight additional cost.

It is also a fact that experience has proven that operating from a central storage battery is a great deal cheaper than operating from dry cells (at their present prices especially) that have to be renewed frequently.

Careful investigation has shown that the average life of a pair of dry cells is about eight months and according to records kept by various companies the average cost of changing a pair is $1.12 per station for telephones in the city limits and $1.50 for those in rural districts. Figuring on this basis the average cost per station per year is $1.68 for city phones and $2.25 for rural phones.

Take this instance of battery saving in an exchange of 425 city subscribers.

Number of local city subscribers, 425.		
Average cost per station per year (dry cells) . .	$1.68	
Average cost per station per year (storage batteries)	.10	
Saving by eliminating dry cells per station per year	$1.58	
Saving on 425 stations per year		671.50
Cost of furnishing battery for operator's transmitters on your present board based on changing three times every two months, or 72 dry cells per year, $0.35 each or . . .		25.20
Power for charging present storage batteries used on ringing machines (estimate) $2.00 per month		24.00
Total saving per year		**$720.70**

On the strength of this actual saving, the manager of this exchange went to the banks and borrowed the money to pay for his Kellogg Service Switchboard.

In arriving at the above conclusions, the cost of handling, drayage, breakage, deterioration, etc., or placing of the batteries in the warehouse was not included.

Actual experience also proves to operating men that the multiple line lamp feature of our common battery service boards speeds up the service to a remarkable degree and also cuts down the operating force.

X X X X X

These are facts well worth the consideration of the exchange manager who wants to give the best type of service—but without a big expense to face in the transaction.

The Kellogg Service Switchboard is absolutely a money making, money saving proposition.

That is what we particularly want to make clear to you.

Think over that point about dry cells—remembering the expense of their hauling, drayage, breakage, deterioration or placing in warehouse.

Then think of these obstacles removed and in its place quiet, even uniform transmission flowing from storage batteries and of the many favorable results of common battery service.

Then let us make a study of your exchange (without cost to you) and advise you frankly and accurately on the matter of common battery service for your plant.

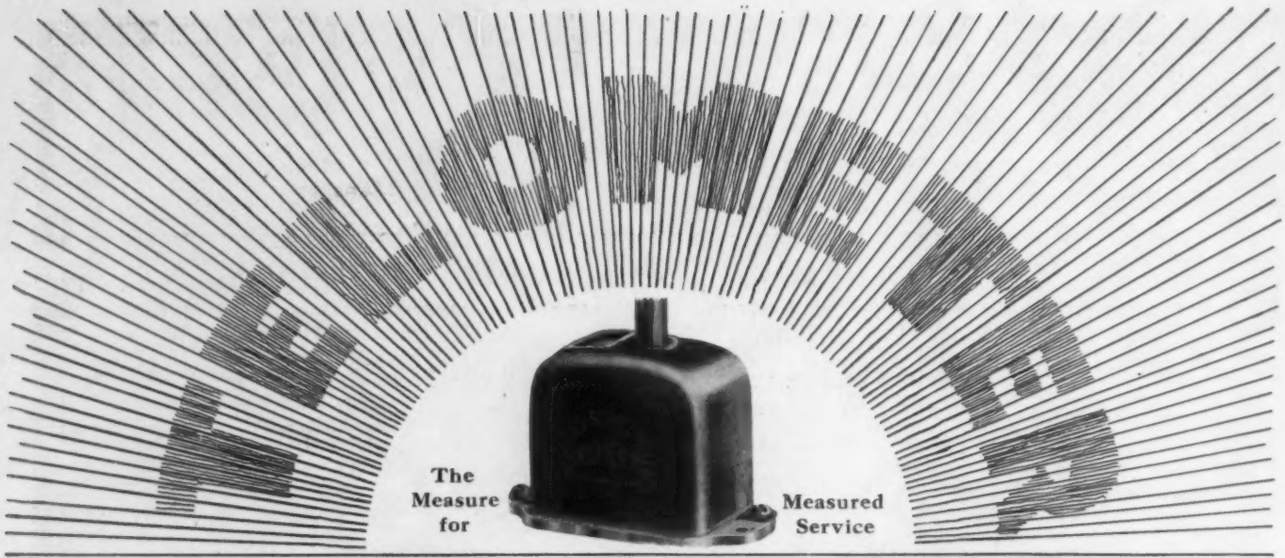
USE IS THE TEST

Kellogg Switchboard & Supply Company

CHICAGO, ILLINOIS

Branch Offices: Kansas City, Mo., San Francisco, Calif., Columbus, Ohio

Distributing Houses: Canada West Electric, Ltd., Regina, Sask., Can.; Northwestern Electric Equipment Co., St. Paul and Duluth, Minn.



The DAWN of A NEW ERA

The Telephone Meter That Measures Service

Income Increased—
Profits Guaranteed
Satisfaction Assured

Send for Our Descriptive Circular

Manufactured by

Measured Service Meter Company

Uniontown, Pa.

TELEPHONE ENGINEER

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Editorial Mention

When the Telephone Was New

An interesting experience of his was once told me by Alexander Graham Bell in the early days of the telephone, says Mr. William W. Ellsworth in A Golden Age of Authors. At the time of the Centennial Exposition in 1876, he was invited to go to Philadelphia and exhibit his new invention at a meeting of men of science. He was inclined not to accept, but the lady who has so often helped him and who was then his fiancee—she is now Mrs. Bell—insisted on his going, lent him money, took him in a carriage with an assistant and all the necessary paraphernalia to the station in Boston and started him on his way.

In Philadelphia a wire was put up that reached about a mile, and on the evening of the test the assistant was placed at the other end. The most distinguished man of science present was asked to speak into the strange-looking receiver. It was Sir William Tomason, afterwards Lord Kelvin. He hemmed and hawed, while the audience waited for the words of wisdom that would come from his lips; then he said, "Hey, diddle, diddle, the cat and the fiddle— Finish that." He waited a moment, then exclaimed, "'The cow jumped over the moon!' He said it!"

There was great applause. The telephone was a success. Spoken words had been heard and a question answered at the distance of a mile.

When Prof. Bell met his assistant he said to him, "Could you hear Sir William Thompson plainly?"

"I did not hear him at all."

"Not hear him at all? What did you say?"

"I said, 'Please repeat! Please repeat!'"

That was all that had been said in reply to Sir William. The question is, Did Sir William think he heard "The cow jumped over the moon," or, like the gentleman he was, wishing to make a young inventor's experiment a success, did he merely say he heard it?

We Will Soon Telephone to Europe

The American people long ago ceased to wonder at successive steps in telephone development, marvelous as those advances were. Mr. H. B. Thayer, president of the American Telephone and Telegraph Company, says that it will soon be possible to extend telephone service to ships at sea and to foreign countries.

Apparatus has been developed whereby the human voice can be automatically transferred from a land telephone to a wireless telephone service at a "radio exchange." This, it is explained, has been made possible by the development of devices that increase thousands of times the volume of sound as it issues from the mouth of the speaker.

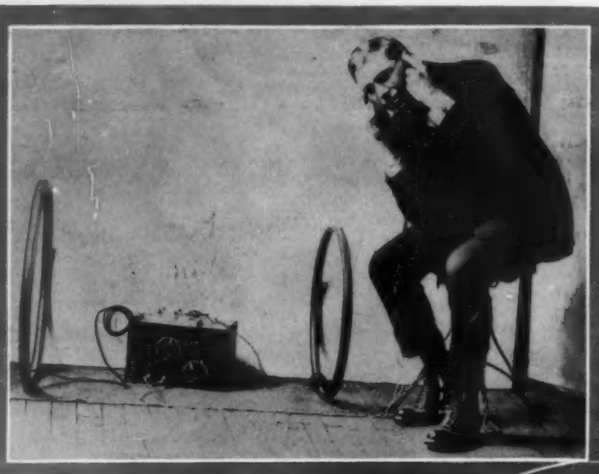
The head of the Bell system would not have made that statement unless he were sure of his ground. It removes from the realm of romance and speculation to the province of scientific achievement, present and future, the prospect of commercial telephoning by wireless over long distances. But it is to be noted that Mr. Thayer does not say that everything is in readiness for the actual establishment of such a system of communication. He says that "as the art advances" it will come to pass.

The Telephone is Much Abused

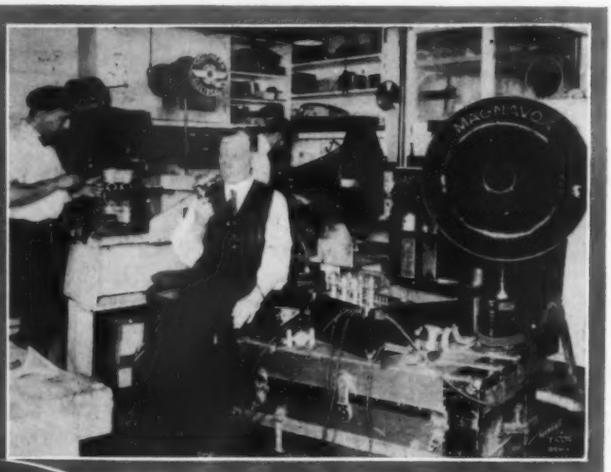
A young lady asks us to write an editorial on telephone abuses, hoping it may serve to correct them. She has more faith in the power of the press than we have for we have been correcting telephone abuses for twenty years and they are still here. The trouble is that they are not due to the telephone, which, like the automobile, is merely one of the modern instruments which adapt themselves readily to the display of human weakness and meanness.

Our young lady, who is a businesslike and efficient young person, notes the freedom with which the office telephone is used for long, useless and, to outsiders, extremely silly conversations. Persons employed in an office who use the office telephone in this way are merely stealing the time they sell to their employer, as well as diverting or annoying their fellow workers. An office telephone should be used exclusively for business purposes or, if a personal message is occasionally necessary, it should be brief and to the point. Then, our young lady says, some people are so cross over the telephone, so angry if there is a delay or a mistake, though it be their own fault, so quick to blame any cause of irritation upon the operator who is doing her best. These breaches of good manners are caddish and disgusting, reflecting as they do the pettiness and petulance of human nature, but they go deeper than the telephone cables and probably cannot be wholly eradicated for some years yet. If it is any comfort to our yonug lady, they don't really hurt her any if she keeps her own temper and does the best she can.

PILOTING CABLES IN NEW YORK HARBOR.
Two cables are laid through which electric currents will run and the ship using a receiving apparatus will be able to guide a straight course, at night, by steering directly between the cables. The illustration shows the receiving apparatus on board ship.



NEW INVENTION MAGNIFIES THE VOICE.
The Magnavox for public speakers. The speaker stands by glass enclosed stands and speaks into two receiving horns placed directly above his head. These carry the voice through the reproducing mechanism to horns placed at intervals around an auditorium or stadium.



Top and Center Photographs by Keystone. Lower Photographs by International.

Type of Automatic Telephone to Be Used by New York Telephone Company.

"PHYSIOLOPHONE" ENABLES DEAF TO FEEL MUSIC.
Deaf people by holding wires in their hands are enabled to feel music. The vibration of the phonograph needle is felt through the wires, a sensitive microphone being used.

PHYSIOPHONE APPARATUS.
The instrument through which deaf persons may feel music. Invented by Dr. Garnsback.

The Telephone in Foreign Countries

Items of General Interest to Telephone Men From All Parts of the World

By G. P. BUNKER.

Engineer Called by British South Africa

American engineering circles are considerably interested in the announcement that Dr. H. J. Van der Bijl, who figured very prominently in the development of the vacuum tube, the nerve center of the radio telegraph, and who is conceded to rank among the leading authorities on thermionics, is about to leave the United States. He has accepted the call of his birthplace and will proceed immediately to his home at Pretoria, British South Africa, where he has been appointed scientific and technical advisor to the Bureau of Mines and Industries of the Union of South Africa. His duties will consist for the main part in establishing a bureau of standards for the authorities of the dark continent.

Dr. Van der Bijl comes from an old family of Boers. During the time that Lord Roberts was operating about Pretoria, the father of the well known scientist was mayor of the doomed city. A few years later Dr. Van der Bijl finished his studies at Victoria College, British South Africa, thereafter entering the University of Leipsic, where he gained his doctorate. He came to the United States in 1912, joining the engineering department of the Western Electric Company, and for the last seven years he has been a prominent member of the personnel of its research laboratories at West Street, New York. He was instrumental in devising several of the improvements in telephone and telagraph instruments which the Western Electric Co. has brought forth during the last few years.

Irish Authorities Will Use Wireless

The government authorities, owing to the frequency with which telephone and telegraph wires are cut in Ireland, are to make use of wireless telephony, and thus establish a means of communication which cannot be interfered with.

They Have Telephone Brokers in Japan

"Methods of trade in Japan are too advanced. In England it is still very largely the rule for a man to trade with his own capital. In Japan, never. Every conceivable trade and industry is carried on with advances from the bank and every conceivable commodity has its broker. For instance, there are in Kobe numbers of telephone brokers. There is a great demand for telephones in Japan. The supply of them is a government monopoly, and the average time between application and installation is ten years. When anybody gives up his telephone he can transfer it to somebody else. This is where the telephone broker comes in, and he knows the pulse of the market so well that, whereas before the war it was easy to get a telephone for £100, it is no uncommon thing to pay £300 now. The telephone is, indeed, an important gauge of business prosperity. When the slump came last month telephones dropped sharply, probably in anticipation of many businesses closing up; but the fall has not continued, so apparently there is confidence in business continuing to exist, even dully. The prices which have declined were purely artificial, and it is possible that the slump will do a great deal of good. It would be a good thing if it only diminished the number of brokers and reduced things to something like their real value."

Wireless Telephony in British Empire

By permission of the postmaster general and with the co-operation of the Marconi Wireless Telegraph Company, Ltd., the Press Association commenced a series of experiments in the distribution of news by wireless telephone. The Chelmsford transmitting station of the Marconi Company was used as the distributing center. From this ordinary news services were telephoned by one of the regular telephonists of the association. The messages were received at newspaper offices in London, Burton-on-Trent, Sheffield, Newcastle-on-Tyne, Manchester, Preston and Belfast.

Italy to Adopt Automatic Telephone

The intention of the Italian government to spend 10,000,000 lire on the introduction of automatic telephones has been linked with the statement that native firms are to be passed over, and the orders placed in Germany. It is explained that the government, not to compromise the success of its large scheme, was bound to invite competition. During the war there was an agitation against orders for automatic telephones being placed with the English Siemens Company and with the Western Electric Company, and as a consequence the Societa Construttori Telefoni Italiani was constituted, consisting of the five principal firms specializing in this branch, namely, the Societa Industrie Telefoniche Italiane, the Societa A. Perego, the Societa Telefoni Privati, the Societa Adriatica Telefoni and the Societa Giulio Galanti e Ca. There seems little risk of the government passing over the native industry.

Buenos Aires to Try Automatic

The automatic telephone will be introduced in Buenos Aires in 1922 under a contract signed between the city authorities and the Automatic Electric Company, Chicago, which has agreed to install the system. The city already possesses two telephone systems operated in the ordinary way, but there is a shortage of telephone instruments. Concerns establishing new businesses here have had great difficulty in obtaining them, and some have been obliged to forego them. Many persons have profited by surrendering their apparatus to others at a high price.

Multiplex Telephony

A Description of Experiments Made by German Engineers Based on the Squires Inventions

By JAMES ANDERSON

Photos by Gillam Service.

IT has just been announced to the scientific world that German engineers elaborating on experiments originally made by General Squire, chief of the Signal Corps, U. S. A., have recently perfected a method for transmitting a considerable number of telephone and telegraph messages simultaneously over the same wire.

The perfection of this method is due to the fact that in Germany, as well as in almost every civilized country existing, telephone and telegraph wires have for some time past been overburdened with work which has resulted in long delay, poor, and and most unsatisfactory service.

To many electrical engineers the only obvious way out of these difficulties seemed the laying of new ducts, running new wires, building new exchanges, etc., but with the present shortage of labor, material, etc., as well as the length of time it requires to make these additional changes, this solution, it is acknowledged, will require a long time before relief can be fully accomplished.

Germany, due to her great lack of raw material was, when the war ended, in particularly bad shape to cope with the situation along these lines and at the instigation of urgent public demand for some relief the present government shortly after its establishment called upon the leading electrical experts of the country to find ways and means of improving the telephone and telegraph service, using the existing system of wiring. This seemed an almost hopeless task. The only possible way out apparently being the devising of some system of carrying on a number of converations over the same wires.

Before this could be accomplished successfully some means had to be invented to prevent the varied conversations from interfering with each other by assisting the same at the receiving end and sending each individual message into its proper instrument.

Sending Apparatus for Multiplex Telephony.

It was there that the attention of Prof. Fassbender and E. Habann, two German engineers, was attracted to the reports of the experiments made in Washington, D. C., in 1911 by General Squire.

He was able to hold as many as five different conversations without interfering with each other, over the same wire, using essentially the same equipment as is now used in wireless telegraphy, namely, high frequency currents, which change their directions 100,000 times or oftener per second. These are inaudible to the human ear and therefore do not interfere with the clearness of the voice.

Arrangement of high frequency long distance apparatus at Central station, Berlin. In front of picture are seen the sending apparatus and further back the receiving apparatus. Reserve apparatus are always kept on hand. In the center is the control board and operator.

Although General Squire's experiments caused a lot of attention, it was not possible to put the same to practical use at that time, as the apparatus for the sending and receiving of these high frequency currents was so complicated and delicate that they had not then been developed to the dependable stage.

This the German engineers above mentioned now claim to have accomplished and recently three trial lines working what is known as the multiplex system have been established. These lines are the Berlin-Hanover, Berlin - Frankfurt, and Berlin - Stralsund. The first line opened about six months ago, for commercial use, was between Berlin and Hanover (about 200 miles).

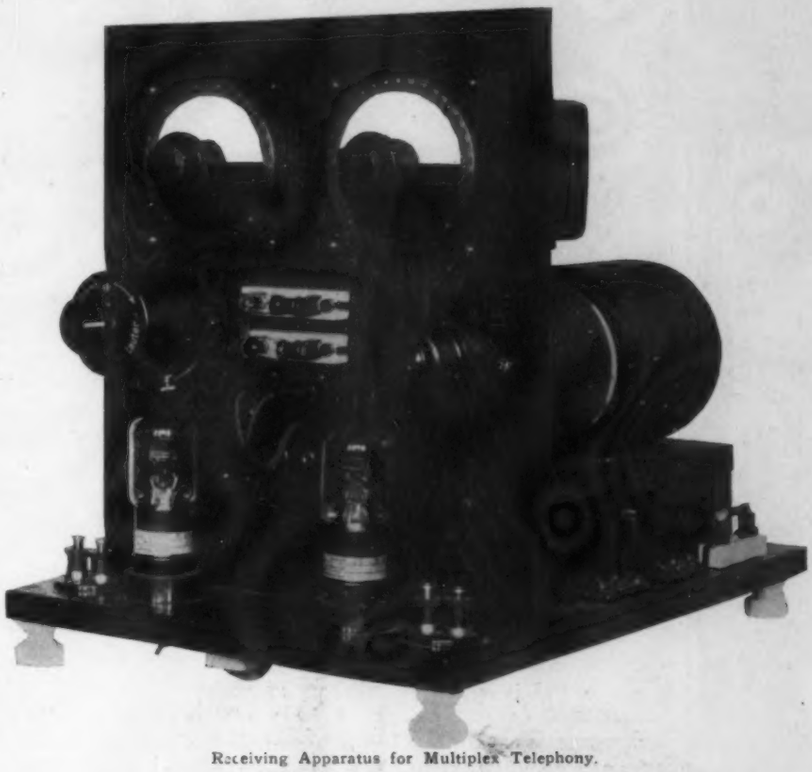
Receiving Apparatus for Rapid Telegraphy.

In wireless telephony the high frequency currents are sent from the sending apparatus in the form of waves into ether where they spread themeslves in all directions and only a very small percentage of these waves are taken up by the receiving apparatus.

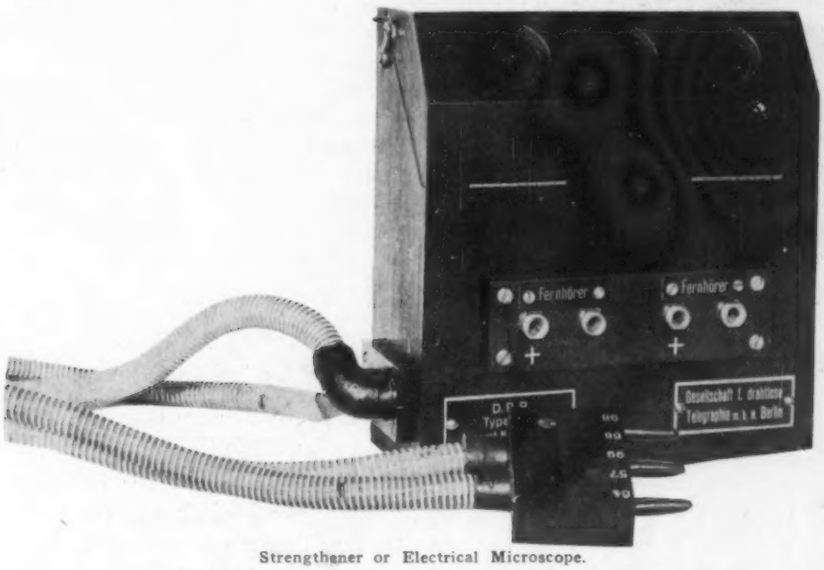
In the multiplex telephony now being used in Germany these waves are carried along the wires, avoiding the scattering of them as is unavoidable in wireless.

The effect upon the receiving apparatus of high frequency currents is different, according to the number of changes of direction per second, and the receiving apparatus can be adjusted so that it will respond only to a certain number per second and currents of different frequencies have no effect upon it. Thus the voice over the multiplex system is said to be absolutely clear, and quite free from other voices, which often make conversation on ordinary telephones bothersome.

The installation and use of the high frequency connections does, it is claimed, in no way interfere with the use of the former instruments and therefore this new invention will prove a great benefit to the former system, as the capacity for handling calls will be so much greater and the price of the new apparatus is only a small percentage of the cost of laying new lines, etc.



Receiving Apparatus for Multiplex Telephony.



Strengthener or Electrical Microscope.

Only for short distances, the Germna engineers claim, is the multiplex system still impractical, as the cost for upkeep of the high frequency apparatus is as yet too high, but the inventors are now working on this and promise a solution very shortly which will make this multiplex system of telephony practical for intercity calls.

Multiplex-telephony between Berlin and Hanover having proven so successful, it was recently decided to establish a similar line between Berlin and Frankfurt, as well as between Berlin and Straslund, using in the latter case the new established long distance line between Berlin and Stockholm.

These lines have worked out so successfully that the German telegraph administration has decided to work, in the near future, the multiplex system on a big scale over all the present existing lines. Fifty new high frequency long distance connections are to be established immediately between the main business centers of the nation.

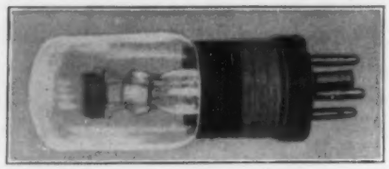
While the development of high frequency telephony is being carried on in Germany the development of high frequency telegraphy is also being pushed forward. In this case rapid telegraph machines are used to hasten the sending and forwarding of telegrams. These machines can telegraph from 800 to 900 letters per minute.

Trials and experiments made so far have proved that it is possible to make over the Berlin-Frankfurt long distance line (about 400 miles) besides multiplex telephoning, six different rapid telegraph connections at one time, these connections having a capacity of about 5,000 letters per minute.

While it is possible to use a greater number of systems over one line, from a practical viewpoint

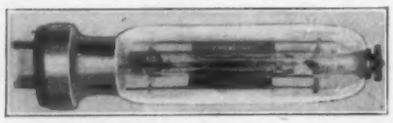
this is not at present regarded as advisable, because in case of trouble or disturbances on one of these overloaded lines the operation would be too much hindered.

The experimenting and working in this new field of multiplex telephony and telegraphy is now being carried on at the laboratories of the German Government Tele-



Strengthening tube, called the Electrical Microscope, with which it is possible to strengthen electrical current 10,000 times.

graph Administration under the guidance of Dr. K. W. Wagner, assisted by a large staff of engineers, physicist and electrical experts. Connected with these is the firm "Telefunken" with Count Arco and Dr. Alexander Meissner at its head, as well as the firm of Simons and Nalski and finally the German Telephone Works, who are all busy with



Oscillator tube for production of electrical currents, which change their directions 100,000 times and oftener per second.

the perfecting of inventions relating to Multiplex Telephony and Telegraphy.

General Squire, whose idea the Germans have borrowed, served in both France and the United States during the world war, and previous to the participation of the United States was military attache at the American Embassy in London. His scientific knowledge and experiments led in a comparatively brief time to his promotion from the rank of major to that of major general with command of the United States Signal Corps, which played an important role in the war.

That German engineers rather than American should have perfected his experiments may have been, in a measure, due to Squire's rapid advancement in rank, which, with active war duties, precluded further experimentation.

Loud Speaking Device For Ships

Announcement was made by the Western Electric Company recently that for the first time in the history of vocal transmission, direct communication had been made with an outgoing steamer without the aid of any receiving apparatus. The experiment which was made when the Cunard liner, *Imperator,* sailed for Europe recently was pronounced a decided success by R. L. Jones, transmission engineer of the Western Electric Company and his co-worker, R. C. Mathes, in a cable from England.

The passengers on the former German liner were amazed as they sailed down the North River and towards Narrows to hear a deep penetrating voice boom out from nowhere, "Steamship *Imperator,* ahoy! Paging Mr. Jones, Mr. Mathes." The call which was repeated several times might have been that of a New York bellboy. There was only one difference—it was intelligible. Immediately all sorts of rumors began to circulate. Some folks with guilty consciences wondered if they had already passed the three-mile limit. There was one thing certain. Some voice was coming out of the Heavens and it was not paying any attention to the cries of the sailors, the tooting of the tugs, or the chattering of the departing voyagers.

The only one on board who did not seem to show any wonder at the phenomenon was Dr. S. W. Stratton, director of the United States Bureau of Standards. He cocked his ear, listened and smiled. He had seen the imaginations of Jules Verne and H. G. Wells outdone in the developments of the war-racked world during the last few years.

Seemingly having located Mr. Jones and Mr. Mathes the giant voice changed its bell-hop chant. "Bon voyage, Mr. Mathes. We hope your trip will be very pleasant. Just a minute now and we will play you something" and in the same mystic fashion the sweet and clear notes of "It's Apple Blossom Time in Normandy" drifted over the ship.

"Good Lord," shouted the pilot, "I'm about to pile this ship up on the rocks of some cabaret."

Before the scared mariner could carry out his threat however, Mr. Jones explained to the scores of his fellow passengers who had collected in curious groups, that it was only his colleagues bidding him farewell from the Western Electric laboratories at West Street. The "Giant Voice" was coming from one of the loud-speaking transmitters which was developed by the Western Electric engineers, and which had been set up in the window of Mr. Jones' office on the tenth floor. Amplified a million times, the voice of one of the engineers had carried distinctly to the passengers on the *Imperator* above the din and confusion of New York's busy waterfront.

The loud speaker has never been tried before under such adverse conditions. The success of the experiment only forecasts other remarkable achievements for it.

"Imagine some politician returning from abroad talking to assemblages in ten halls in ten different cities from a ship 600 miles at sea, with the aid of the radio telephone and loud speakers," commented one of the engineers.

And it is very probable that with the rapid development of the "Giant Voice" this may be done.

Michigan Has Big Telephone Development

There are now more telephones in Michigan than are to be found on the continents of Asia, Africa and South America, with the orient thrown in for good measure. There are more than in Italy, Belgium, Greece and Spain combined, according to interesting statistics furnished by the Michigan State Telephone Company. Detroit alone can account for more telephones than in the latter three countries and more than in Petrograd, Constantinople, Vienna, and Rome combined. The number of daily messages in Detroit average 730,000.

There are 871,091 miles of wire in use over the state, the increase last year having been 41,078, and the company has more than 9,200 employes.

Illinois Independent Telephone Convention

One of the Best Attended and Most Enthusiastic Meetings of the State Association Is Held at Springfield

THE Illinois Independent Telephone Association held its New Era Convention at Springfield on Nov. 9-11, 1920, with about 250 telephone men in attendance.

The meeting was called to order by President R. E. Gordon who said in part:

"It requires $125,000,000 in Illinois alone to place the telephone companies of Illinois in a position where they can give the service that is proper and required.

"At present most of the companies are not rendering the best service obtainable. To place these companies on a basis where they can give the public the proper service, the above sum is needed.

"There is a great necessity for co-operation among the smaller companies in this state to obtain legislation that will permit a greater appropriation for the use of the public utilities commission in the conduct of hearings of telephone cases. More prompt hearings will put the telephone companies in a position where they can furnish better service.

"There should be a campaign of public utility information to co-operate with the Illinois committee of public information in order to acquaint the people with the requirements of telephone companies. The telephone is the very life of the community, and without the telephone any community would be far behind the times.

"If people expect to get the service they demand and require, they must become acquainted with the needs of the companies that must be satisfied, before the service can be furnished."

The president's address was followed by reports of the secretary and the treasurer.

Upon motion both reports were accepted by the association and the report of the secretary-treasurer was referred to the auditing committee.

The following committees were then announced by President Gordon:

Auditing Committee: H. H. Knipe, Olney, chairman; E. D. Hynemann, Lexington; Dr. W. C. Lumpkin, Mattoon.

Membership Committee: A. R. Patterson, Streator, chairman; A. B. Minton, Murphysboro; J. E. Peck, Rushville; J. C. Stokes, Carmi; R. E. Matteson, Joliet; L. E. Pitcher, Dixon; Howard Baker, McLean; and J. C. Poole, Lincoln.

Reception Committee: F. A. Norris, Monmouth, chairman; Mrs. E. J. Huff, Virginia; Mrs. Jay G. Mitchell, Springfield; Mrs. R. E. Gordon, El Paso; H. I. DeTurk, Waverly; I. A. Logue, Casey; L. J. Hydecker, Rochelle; P. L. Drew, Moweaqua; and F. A. Weber, Pekin.

SUCCESS TALKS

AMBITION

By S. A. CHANDLER

Ambition has very little to do with the man who is satisfied with conditions as he finds them. For it causes a healthy dissatisfaction which forces him to try to better them.

The world is chuck full of people who are contented with their jobs or their lack of jobs; contented to stay at the same desk and do the same thing at the same pay year in and year out.

These contented souls may have nothing particularly bad in them. They may be honest enough and good-hearted enough, but they contribute next to nothing to the progress of the age in which they live, so when they die they leave nothing accomplished by which to be remembered.

A person whose only plea for recognition is that he is NOT what somebody else is, is of very little value. An ambitious fellow with many faults is more worthy than the easy-going, let-things-take-their-own-sweet-course sort of fellow who claims that he hasn't any faults.

But isn't that a fault, and an unpardonable one? To have lived and to have enjoyed the benefits of modern civilization without contributing something to that civilization?

Ambition won't permit a man to remain in a rut day after day. It won't let him be contented with conditions as he finds them. It keeps nagging at him to try to better them. It taunts him by pointing to someone else who has done better than he has.

It says, "You have only to keep your eyes open and to work and think. You will accomplish more if you attempt more. You'll be worth more if you work toward that end. You MUST work more! If you don't, you will be right where you are now one year, two years, ten years hence. Good Lord! Think of yourself doing the same work at the same bench for the same pay ten years from now!"

So, if ambition is kindled in our breast and we don't stifle it, it will drive us on till we do make something of ourselves. It's because it has driven men before our times that we now enjoy the benefits of present-day culture. If it were not for the ambition implanted in the men before our time, we'd still be living in the trees, hunting our food with an ax and arrow.

(Copyright, 1920, by S. A. Chandler)

F. B. MacKinnon, president of the United States Independent Telephone Association, speaking under the subject, "Independent and Dependent," presented figures showing that more than half of the Illinois independent companies have failed to establish new rate schedules, his figures dating from the beginning of state regulation Jan. 1, 1914. This condition, he declared requires study and analysis by the state association. His remarks in part were as follows:

"We use the word 'Independent' to describe:

"1. Those telephone companies not owned or controlled by the Bell company.

"2. The operating practices and engineering methods opposed to Bell operating methods and practices.

"The elimination of competition in the telephone business by the elimination of dual exchanges has made it necessary for us to prove to the public that competition still exists in the industry through a competition in methods. The public must be made to understand that there are two groups in the telephone industry — each with distinctive fundamental principles of engineering and operating practices.

"We believe the independent method more effectual and more economical and productive of more satisfactory service to the public. In maintaining these contentions, we need the best efforts of our managers, our engineers, and our manufacturers. The whole industry needs this competition—but to mkae it effectual we must have the co-operative effort of every independent man.

"We call ourselves 'independent.' Is any telephone company independent? Is it not true that every company is dependent? Were there but one telephone plant in the United States and that one located in Springfield, the company operating it could be independent and maintain almost any sort of rates and practices. But in reality there is a telephone plant in operation in

every city, town, and rural community in the country. The rates and practices of each of these have their influence on the rates and practices of the others.

"Each, though independent, is dependent. There would be no discussion of standards of service were there but one plant.

"The service rendered by the exchange and toll operators in Chicago has much to do with satisfactory telephone service in El Paso. The charge for a toll call must be the same from El Paso to Chicago as from Chicago to El Paso. Even without a public service commission to order uniformity, public demand would require it. Carthage cannot restrict the use of its telephones to subscribers and 'get away' with the rule unless its neighbors for miles around enforce the same rule. Each is dependent on the other.

"To some men in the independent group, the title means 'absolutely free from the necessity of co-operation with other telephone companies.' A man may not co-operate with his fellow telephone managers but he is never free from the necessity of doing so—and in the end if he does not heed that necessity, he will retire really financially dependent.

"Through the courtesy of Executive Secretary Mitchell and J. R. Hughes of the engineering staff of the Illinois Public Utilities Commission, I have been supplied with some data showing a serious condition in the independent group in Illinois—a sure indication of a real lack of co-operation.

"These figures show that of the 558 companies operating, 1,041 switchboards in Illinois, only 265 companies, operating 513 exchanges, have raised their rates since the beginning of commission control, Jan. 1, 1914—a period of six years and ten months. More than half the exchanges of the state are still operating on the old original rates.

"This, I say, is a serious condition—serious, not alone for the companies that are on the old rate levels, but serious, too, for the companies which are being held back, handicapped, by this inefficiency of their neighbors.

"The whole rate level in Illinois must be brought up to new levels, made necessary by new conditions. Unless the rates of the unprogressives be raised, there is danger of the new rates of the progressives being lowered. You are independent but you are dependent. The public cannot understand your demand for higher rates when your next door neighbor, by making no such application, in effect, says he does not need higher rates—can operate under the old scale.

"This condition can be changed only by co-operation. This association must take an active part—must study the problem in detail—and when in possession of full knowledge, must act for those who want to progress but do not understand how, and must see that those who absolutely refuse to advance are eliminated from our group.

"Independent methods and independent control are on trial. If they are to win in this competitive contest, we must all work together, realizing that though independent, we are dependent on our fellow members."

MEMORIZE THIS

If you work for a man, in heaven's name work for him. If he pays you wages that supply your bread and butter, work for him, speak well of him, think well of him, stand by him, and stand by the institution he represents. I think if I worked for a man, I would work for him, I would not work for him a part of the time, but all of the time. I would give an individual service or none. If put to a pinch, an ounce of loyalty is worth a pound of cleverness. If you must villify, condemn and eternally disparage, why, resign your position, and when you are outside, damn to your heart's content. But, I pray you, so long as you are part of an institution, do not condemn it. Not that you will injure the institution—not that—but when you disparage the concern of which you are a part you disparage yourself. And don't forget—"I forgot"—won't do in business.—Elbert Hubbard.

In an address "State Activities Against National," B. J. Mullaney of Chicago, director Illinois committee on Public Utility Information, emphasized the need of co-operation, citing many instances to show what had been accomplished thereby in the past. He presented a general idea of the work of the Illinois committee which supplies readable items to about 300 Illinois newspapers, sends pamphlets to managers of the different utilities in the state, as well as to high schools, etc., in an effort to educate the public concerning public utilities in general and to keep the utilities in touch with matters pertaining to their own interests.

Committees similar to the Illinois committee have been formed in Indiana, Kentucky, Ohio, Missouri, Nebraska, Oklahoma, and others are in course of formation and almost ready for action in Wisconsin, Texas, Colorado, California, and New York.

Senator O. F. Berry of Carthage followed Mr. Mullaney. He spoke of the use of the pamphlets of the Illinois committee in the high school of his city. He said that he had recently been requested by the superintendent of the Carthage schools to make a talk before the high school pupils on the telephone.

After giving an address, he was requested to speak before the primary pupils along the same line. Then other schools in the county wrote him asking for the same address and now some schools outside the county want it. Where it will end, the senator does not know. As a result of those speeches he feels that a great deal of good has resulted to the community, and he urged upon every telephone man in the state: "Go thou and do likewise."

President Gordon announced that he had appointed certain Illinois telephone men to serve on the Illinois committee of Public Utility Information because they represented certain sections of the state and made frequent trips to Chicago. On motion of L. E. Pitcher of Dixon, seconded by Dr. J. G. Schwarz, the action of the president in appointing these men was approved.

Dr. Gordon called upon Mr. Deering, Des Moines, Iowa, secretary-treasurer of the United States Independent Telephone Association; also upon P. J. Weirich of Monroe, Wis., each of whom brought greetings from his own particular association.

President Gordon announced the nominating committee to be comprised of: W. H. Bassett, O'Fallon, chairman; Howard Baker, McLean; F. A. Norris, Monmouth; T. C. Ainsworth, Bloomington; Roy Hall, Westfield; A. R. Pat-

terson, Streator; W. L. Ford, Carbondale; R. G. Roadstrum, Galesburg; G. W. Pringle, Carlinville; and F. A. Weber, Pekin.

THE SECOND DAY'S SESSION.

H. D. Currier of Chicago, chief engineer, Kellogg Switchboard & Supply Co. Mr. Currier spoke on the subject, "Telephone Service," making the point that "service" may mean anything depending upon whether it is the consumer or the producer who is considering it. His address will be published in full in the January number of TELEPHONE ENGINEER.

Cyrus J. Hill of J. G. Wray & Co., Chicago, read a paper on "The Treatment of Inductive Interference on Telephone Circuits," which will also appear in our January number.

Dr. Frank A. Wolff of Washington, D. C., chief, telephone section, U. S. Bureau of Standards, in speaking on the topic, "Telephone Service," outlined the circular which the Bureau of Standards has in preparation.

Dr. Wolff was followed by Miss Margaret Burgi of Monroe, Wis., supervisor of traffic of the United Telephone Company, who spoke briefly on the relation of managers to operating room work. The operator through experience has obtained a real idea of service and of what the public wants. The manager must know what makes for good telephone service. He can only know through studies and the operator can do much in helping make these studies.

A standard form of fire insurance policy was then discussed and a committee of three was appointed to draw up a form. The committee was composed of C. B. Cheadle, E. D. Glandon and J. G. Mitchell which concluded the morning session.

At the afternoon meeting a moving picture, "Wood Preservation a National Economy," was shown by K. C. Barth of the Barrett Company, Chicago.

E. C. Blomeyer of the Automatic Electric Company, Chicago, followed with an address, "Methods or Men," which will appear in full in an early issue.

Mr. Blomeyer's address was followed by a general discussion of topics of interest in which Ben Baker of La Roy, H. D. Currier of Chicago, and Senator Berry of Carthage took part.

Upon motion of C. B. Cheadle, the report of the committee on changing the by-laws to admit all Illinois telephone companies to membership was submitted for discussion. It was read by Executive Secretary Jay G. Mitchell after which a motion was made and seconded that it be adopted.

No adoption was opposed by E. D. Glandon, declaring that in his opinion the best interests of the industry would not be served, for its adoption meant that membership in the association would be thrown open to the Bell companies in Illinois. He cited instances of other states where the force of the organization was lost by such action. He, therefore, moved the amendment of the section of the by-laws relating to membership so that the word "independent" would appear before the words "telephone exchanges" and "telephone toll lines," defining "independent" to mean a majority of stock held by other than the Bell interests.

President Gordon called upon F. B. MacKinnon, president of the United States Independent Telephone Association, to give his opinion. Mr. MacKinnon declared that the independent equipment, practices and the Independent group are needed in dealing with public bodies. In his opinion the Independent group should be preserved, and the Illinois independent companies could be financed by Independents. He favored Mr. Glandon's amendment.

Chas. C. Deering of Des Moines, Iowa, secretary-treasurer of the United States Independent Telephone Association, declared that a loss of prestige among the Independents and the public at large would follow admission of the Bell to membership. On two occasions the Iowa association has voted to maintain its Independent status.

Dr. R. E. Gordon stated that the association could be financed by raising the assessment to 6 cents payable monthly.

C. B. Cheadle of Joliet expressed serious doubts as to the wisdom of adopting the by-laws in the form reported by the committee of which he was a member. He presented a full analysis of the factors to be considered in arriving at a decision as to taking the Bell into the association.

The discussion being ended, a standing vote was taken on Mr. Glandon's amendment and it carried, 36 voting for it and no vote being recorded against it.

Other amendments were made to the by-laws as presented to make them conform to the change produced by Mr. Glandon's amendment, after which a motion to adopt the by-laws as amended was put and carried.

The committee on the Bell toll contract made a report to the convention which was adopted.

This was followed by talks by Senator Berry and J. M. McShane of Kansas City.

Paul D. Myers of the Stromberg-Carlson Telephone Mfg. Co., then read a description of a new simplified keyboard for multiple switchboards which reduces the amount of apparatus before the operator. He told of its particular features in detail and described an installation for the Home Telephone & Telegraph Co. of Fort Wayne, Ind.

After hearing Mr. Mevers the convention adjourned for the day.

THIRD DAY'S SESSION.

There were no addresses or papers at the last day's session of the convention. Reports of the different committees were read. The nominating committee presented its report and upon motion it was accepted. The secretary was instructed to cast a ballot for those nominated. A list of the officers elected follows: Dr. R. E. Gordon, El Paso, president; E. S. Sterrett, Henry, vice-president, and B. M. Burke, Carlinville, secretary-treasurer.

The following were elected to serve on the board of directors: W. H. Bassett, O'Fallon; Ning Eley, Des Plaines; F. A. Weber, Pekin; H. H. Knipe, Olney; A. R. Patterson, Streator; E. S. Sterrett, Henry; A. B. Minton, Murphysboro; E. D. Glandon, Pittsfield; C. L. Fisher, Pontiac; F. C. Stokes, Carmi; L. E. Pitcher, Dixon; Dr. W. C. Lumpkin, Mattoon; T. C. Ainsworth, Bloomington; F. A. Norris, Monmouth; and Dr. J. G. Schwarz, Jerseyville.

The finance committee was continued and instructed to render its report to the board of directors.

C. B. Cheadle reported for the special committee on a form of standard fire insurance policy. It recommended the adoption of a standard form to be attached to insurance policies for telephone companies. Upon motion this recommendation was adopted.

The membership committee in its report favored district meetings as the best method to increase the association's membership. The presentation of the report was followed by a discussion which brought out the plans of the officers for holding the meetings.

The report of the resolutions committee was presented by E. D. Glandon, and upon motion it was adopted. The resolutions are:

"Whereas, birth and continued existence has been given to Independent telephony in Illinois by community-loving, forward-looking, self-sacrificing men and women, not for personal aggrandizement but in order that their respective communities might enjoy the benefits and enlightenment which the telephone—the greatest of all inventions—might bring; and,

"Whereas, in so doing they have not only been a blessing and made possible a greater degree of intelligence and neighborliness but have given us an example of good citizenship; therefore be it

"Resolved, That we hereby call upon the leadership and the membership of the great telephone business in Illinois to emulate their example, and permit no man or woman or group of men or women to excel them in serving their respective communities and their fellowmen, thereby enriching life and giving standing to their own business and becoming eligible to claim the promise that 'He who would be greatest must become servant of all.'

"The state of Illinois in 1913 placed upon the statute books, a law creating a commission for the regulation of public utilities; for the supervising of the issue of stock, bonds and notes of such utility; for the fixing of rates and determining the character of service of such utilities to the people in their respective communities for the benefit and protection of the people as well as for the permanency of such utilities, thus making the investment by the people in such utilities more permanent and thereby encouraging the construction and maintenance of utilities for the convenience of the people in each community and, further, guaranteeing to the utilities reasonable rates for the service rendered by protecting the people in each community from unjust or unfair rates.

"This policy has been adopted in practically all of the states of the Union and has proved to be a proper, successful and fair way of handling these great interests.

"We, the Illinois Independent Telephone Association, in convention assembled, hereby declare our belief in the system of state-wide regulation which has proved to be in the interests, in every particular, of the people. We favor supervision and regulation by a commission.

"We do not believe that the buyer of utility service in each local community from a public service company should fix the rate of the service so purchased, but that such rate should be fixed by a disinterested, competent commission.

"Resolved, That we recognize the great principle expressed in the Golden Rule as the true basic principle that should govern our conduct in our relations to the public and that our first duty, both to ourselves and to the public, is to give practical expression throughout our various activities to the recognition of such principle.

"Resolved, That we heartily commend the work being done by the Illinois Committee on Public Utility Information through its news bulletins, high school information service, newspaper publicity, public speakers' bureau, and other agencies, and that we co-operate with such committee through our representatives thereon and through the membership of our association in every practicable way in the work that such committee is doing, to the end that the public may be fully and correctly informed regarding the problems with which the telephone industry and other utility industries are confronted, and to the end that through intelligent and cordial co-operation between the telephone companies and other utility companies and the public, such companies may grow and prosper and the public be served in a more adequate, comprehensive and efficient manner.

"Resolved, further, that we urge upon the members of this association as one of the most important duties with which they are charged that in every way possible, through the public press, through public meetings, by means of circulars and pamphlets, and by every other means available, to inaugurate and carry forward a campaign of intelligent publicity in the respective communities where they operate, to the end that the public may know the actual facts, circumstances and conditions under which such companies are carrying on their business and to the end that the best interests of such companies and of the public shall be advanced and the service to the public enlarged, extended, and make more efficient and valuable to the people."

Upon motion of Senator O. F. Berry, President Gordon declared the convention adjourned.

The Goddess

Impersonally, impartially she hearkens to our cabalistic desire and swiftly she moves to grant it, whether joy or sorrow is the outcome. Awake, alert at any hour, she awaits our call.

Though we cannot see her, we hear her thousand voices sounding over the wide world. With the true grace of an immortal, she favors none. Against our pleasure or our anger she is proof. Rich and poor are alike in her sight. The tribute she demands is small, and the laborer's mite is as welcome as the plutocrat's offering.

For us she annihilates time and space, and if we cry for the impossible, she will endeavor to achieve it that we may be satisfied.

She is the daughter of Democracy and Invention, and her name is Hello Central.
—Popular Magazine.

Safeguarding Public Utilities

An Address Before Credit Men in Which the Necessity for Communities to Insure Credit of Utilities Is Emphasized

By SAMUEL INSULL

Mr. Insull is well qualified to speak on public utility matters. He is president of the Commonwealth Edison Company, Peoples Gas Light and Coke Company, Middle West Utilities Company, the Public Service Company of Northern Illinois, and chairman of the Board of the Chicago Elevated Railways. He operates many other companise. The Insull companies represent an investment of approximately $456,000,000 ,and operate in fifteen states.

THE public utility question is always with us—daily, when we get on a street car; monthly, when we get our bills for electrical energy. It is a constant companion, even more frequent than the tax gatherer, and therefore not overpopular with us.

One cannot conceive of the representative of the internal revenue department of the United States government being overpopular with any of us for the last few years, and I am not sure but what the same attitude of the public exists towards the public utilities. And yet those utilities and their success are an essential part of the development of any community, be it a large metropolitan community like the city of Chicago, or the towns and villages that surround it. The proper development of the utilities has a great deal to do with the orderly and rapid development of city and, I might say, today, of country life.

We had a great example of a lack of functioning of the greater utilities—the great interstate railroads—at the beginning of the war. Their credit, largely injured by a mistaken public attitude towards them, and largely injured, I think it is only fair to say, by their own acts, was such that it was impossible for them to raise the necessary funds to enable them to function during a period of such great stress as existed during the great war, and as a result it was practically a necessity under which the government acted when it took them over.

That same state of affairs is quite possible with relation to local utilities. Utilities, as a whole, in the life of our community and of the state, are of comparatively recent development. The gas utility is about the oldest. Water and sewage utilities existed to a limited extent even before the introduction of gas, but of the great utilities of today, gas is about the oldest. I think it was in 1849 the first gas utility was established in Chicago.

It is only in relatively recent years that we have had the telephone. The first telephone was shown in Chicago in 1878, and I think the Chicago Telephone Company was organized in 1881, or a little later.

Electric light is of a later date. The first public street lighting in the state of Illinois, I think, was in Belleville, and about the same time in Springfield, in 1880. It was not until 1885 that electricity was distributed in this state from a central station, and if my recollection serves me correctly it was in the city of Elgin that the first central electrical station plant was established. It was as recent as 1888 that the old Chicago Edison Company started the distribution of electricity in the city of Chicago, and when I came to Chicago in 1892 there was less than a million dollars invested in the business of that company.

It could not have been earlier than 1883 when Mr. Van Depoele made his first exhibition of an electrically driven street car in the city at an exhibition held on the lake front here. So all these things, except gas, are of recent origin.

The earliest figures we have of total investment in the business are from the census records of 1902. There was invested at that time in electric railways, telephones, electric light and power, and gas utilities, about $375,000,000 in the state of Illinois, and the gross income was something under $50,000,000. Taking the figures issued by the census of 1917 and bringing them down to 1920, there is today about $1,250,000,000 invested in these four utilities in the state of Illinois. They have a gross revenue of about $250,000,000.

For every dollar invested it takes five years to turn that investment. That is, if one of these utilities gets a dollar of new business it takes about five dollars of new capital to operate that business. And as a result, about $100,000,000 of new capital is required annually in the state of Illinois by the four public utilities referred to.

Most of these utilities are privately owned. I have not referred to the water business, which is very largely publicly owned. There is a comparatively small amount of gas business publicly owned, and a very small amount of electric light business publicly owned. All street car service is privately owned, I believe, with the possible exception that the city of Chicago has under certain conditions the right to acquire the street car lines of this city.

A business which has $1,250,000,000 of the money of the people of the state invested; which has 275,000 direct investors in the state, to say nothing of the indirect investors in the shape of those holding life insurance policies and those having funds in banks, both of which class of institutions are very large owners of public utility securities; a business which requires $100,000,000 of new capital yearly, and which has in its service between 100,000 and 125,000 citizens of the state; which has upwards of 1,700,000 customers in the state; which furnishes transportation to practically the whole population of the state at some time in the year or another, and a business whose

rate of charge — it matters not whether it is an electric light company or a gas company or a street railway company or a telephone company — is mainly dependent upon the price it pays for the money necessary to extend its plant to meet the requirements of the community; a business of that character—and that is the character of the public utility business—is one which is of far greater and far more vital consequence to the citizenship of the state than it is to the so-called owners of the properties themselves.

It is fair to assume that investors in public utilities do not put all their eggs in one basket, and do not confine themselves to this one particular class of investment, and that if they should lose a portion or all of their investment in a particular property, it is simply one of those incidents that all who invest money are subject to, and that the failure of any one particular enterprise would in all probability be of less consequence to those who invest their money in it than it would be to the community served by it.

Take, for instance, the Peoples Gas Light & Coke Company. That has been the football of politics for so many years in this community that I suppose I can discuss its affairs very freely in public. They have been ventilated so often before council bodies and commissions and other bodies. The stockholders and bondholders of the Peoples Gas Light & Coke Company have seen their securities go to a minimum price. They have seen their dividends passed. They have seen large losses made; that is, losses from current operation. Supposing that had been carried to a point where the company ceased to function. Would it have been a greater loss to the 12,000 to 15,000 security holders or to the 700,000 consumers of gas in the city of Chicago?

That is the viewpoint that I especially wish to bring home to you—that this question of the proper treatment of public utilities, of the maintenance of their credit, of the insurance of the stability of their securities, is a question of far greater moment to the community as a whole than it is to the owners of the properties themselves.

We have heard all kinds of talk with relation to traction barons, electric light barons, gas barons and all other kinds of barons, which is, of course, ridiculous. These properties are not owned by any one individual. They are owned by —take the properties of the state as a whole—about 275,000 different individuals. The Chicago properties, as a whole, are owned probably by 100,000 to 125,000 individuals.

We have heard a good deal of getting blood out of a stone, or milk out of a turnip; namely, getting transportation for less than it is possible for transportation to be produced. That class of talk does not get us anywhere. It will not enable us to get satisfactory transportation which any city urgently needs. It is not possible to continuously get service for less than service costs.

Nobody knows better than you, as credit men and credit women, that an institution which steadily loses money cannot possibly be entitled to credit, and unless the public utilities are so regulated that their credit will be improved and built up, it is not possible to raise the necessary money that the transportation demands of a growing city like Chicago requires and demands from year to year.

There is one aspect of this industry that I think will appeal to you as credit men. I will refer again to the losses of the security holders of the Peoples Gas Light & Coke Company. Those losses are the losses on quoted prices of securities in the public market. They are not losses of actual property, and in these days of commission regulation, when rates are based upon actual valuation of property, and when securities are only allowed to be issued based on the actual expenditures for new property, losses such as I have spoken about are of a merely temporary character. It is very different, indeed, to losses incurred in a business where the capital is more liquid and where it can be turned over, say, once, twice or three times or four times a year. It does not matter what may be the position of the utility in the community for a moment. Its property is there just the same. And if its owners have patience to wait until the good common sense of the people demands that that utility should be treated with ordinary fairness, the chances are, if the original investment has been wisely made, that the deterioration in value is but temporary. The property cannot run away. Its investment is of such a permanent character that if the revenue obtained from it be only sufficient for its proper maintenance, the property is still there. The time comes when the service rendered is paid for on a proper basis, and if the securities have been conservatively issued, the owners are bound eventually to get a return on their money invested.

I think this point is very well illustrated by a remark made to me by the governor of one of the eastern states when we were driving across town a few months ago. He said, "Insull, I wouldn't want to be in your line of business." "Well," I said, "Governor, I wouldn't want to be in your line of business." He said, "Now, tell me why?" I didn't ask him why he wouldn't want to be in my line of business. "Well," I replied to him, "the property that I have charge of remains here. I remain here. The people in your line of business, Governor, change every few years. And I prefer a permanent to a temporary class of business."

And with all its troubles—and there are a great many troubles, and they have been very serious during the period of high prices—with all its troubles, I think that the public utility business of the state as a whole is in reasonably satisfactory condition. The securities of the street railways are probably in the poorest condition. They have a much harder problem than have the other utilities. The proportion of labor to gross revenue is very high, indeed, in the street railway business. The idea of a fixed fare, irrespective of the amount of service rendered—that is, irrespective of the distance you carry a passenger—is a very serious matter for them to deal with.

But take the local utilities. Take the telephone business—and we couldn't get along from day to day without it; or the electric light and power, or the gas business. I can not recall any important organization engaged in those three busi-

nesses that, during the stress of hard times, of high cost, and an unchangeable selling price—except by permission of some regulating body—I cannot recall of any one important gas, electric light or power utility that has gone into the hands of a receiver as the result of the stress of the period of war and the period of high prices following the war.

I want to reiterate, in conclusion, that the question of rates for service is a question of cost of money, and except to the extent that the rate is influenced by the general money rates of the world, the question of the cost of money is a question of credit. You cannot expect your public utilities to obtain credit in the money markets of the world, or the money markets of this country — which are practically the money markets of the world today —unless those corporations are so regulated that they can earn enough money to maintain their property and give a return to those who invest their money locally in those properties.

It is to your advantage, it is your duty, if you want to see your community prosper, to see to it that these great agencies, these great servants of the body politic, are allowed to prosper to a reasonable extent. If you do that, you establish their credit in the money exchanges of the country. You enable them to get their funds at reasonable prices. You help to maintain the stability of their investments by maintaining their earning power, and you confer upon them what in your judgment must be the one first essential to success in any line of business, namely, the necessary credit to justify those who have money to loan to trust them.

A. T. & T. Reports for Nine Months

The American Telephone and Telegraph Company reports for nine months ended Sept. 30 surplus after charges $39,158,721, and surplus after dividends $12,631,430.

Earnings for nine months ending Sept. 30, 1920, follow. Comparisons cannot be made with the corresponding period of 1919, as the company made a statement only for the fourth quarter of 1919, due to the fact that it was the first complete quarter since Aug. 1, 1919, when the properties comprising the Bell system were returned by the government.

Nine months to Sept. 30, 1920 :	
Dividends	$26,079,476
Interest and other revenues	22,281,001
*Telephone traffic (net)	11,900,946
Total	60,261,423
Epenses, inc. prov. for fed. tax	6,970,963
Net earnings	53,290,460
Deduct interest	14,131,739
Balance	39,158,721
Deduct dividends	26,527,290
Balance	12,631,431

President H. B. Thayer of the American Telephone and Telegraph Company says: "That the ownership of the American Telephone and Telegraph Company is becoming more and more national and representative is shown by the latest analysis of the records of stockholders of the corporation. Not only are the proportions of stockholders in the various sections of the country becoming more equalized, but the proportion of small stockholders is increasing rapidly.

"Of all American corporations this company is third in the amount of stock outstanding, but it is first in number of holders of common stock. Of the big corporations it has, perhaps, the widest distribution of ownership and the smallest average holdings per stockholder. There are now over 135,000 recorded owners of the company's stock and the average holdings are less than $3,300.

"Another interesting development is the entrance in the last four years of a large body of employe stockholders. Under an easy payment plan which the company announced to employes Jan. 1, 1915, and an extension of this plan, in March, 1916, over 23,400 of those purchasing shares continue to hold stock. On Dec. 1, 1919, a new offer of stock was made under which any employe of at least one year's service could purchase a limited number of shares, paying for them at the rate of $3 per share per month. This offer has proved very popular; 46,126 employes in August, 1920, were making payments on 184,580 shares, an average of four shares each.

"It is probable that 25 percent of the stockholders will be employes and 25 percent of the employes will be stockholders, when the employes now purchasing stock finish paying their installments.

*One month estimated

Fort Wayne to Spend a Million

Plans for great development to be carried out at an expense of more than a million dollars and which will eventually mean an entire new telephone system in this city with a new central office building and two or three additional branch exchanges, were announced by the Home Telephone and Telegraph Company of Fort Wayne, Ind. Frank E. Bohn, general manager of the company, said that the improvements are necessary for the company to be in a position to provide adequate service for Greater Fort Wayne.

"We are forming our plans now," he declared, "that we may be prepared to serve not only a growing list of subscribers, but also those who will come to us by virtue of an enormous increase in population due to Fort Wayne's new industry, the International Harvester Company, and other factories that are bound to follow."

As the first step in its development, the telephone company has employed J. G. Wray & Co., consulting telephone engineers, of Chicago, to make a survey of the property and city. Mr. Wray, head of the firm, will personally direct the work, which will require nine months or a year to complete. The survey is to include a thorough study of present equipment and conditions. The number of subscribers and prospective subscribers will be noted as all conditions bearing on the future growth of the city are taken under consideration. A large increase in population due to the coming of the Harvester plant will be borne in mind as the engineers survey the possible growth of Fort Wayne, and all other details that are bound to cause expansion in the city will be considered.

After concluding the survey, the engineers will lay plans for telephone service to accommodate Greater Fort Wayne. These plans eventually will mean an entirely new system, a complete rehabilitation of the telephone property, including much more underground work, a new office building and an addition of two or three branches.

The Home of the Strowger Aut

Morgan and Van Buren Streets

AUTOMATIC ELECTRIC COMPANY—FACT

Building No. 1 has been in operation nearly 20 years. In 1907 Building No. 2 was constructed, and Building No. 3 was occupied during the past summer. Building No. 4 is now in process and will be in operation early next summer.

When the fourth unit is completed the plant will have a total floor area of nearly 10 acres, and will have a capacity

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BRANCH OFFICES:

New York City 21 E. Fortieth St.	Philadelphia The Bourse Bldg.	Boston 445 Tremont Bldg.
Rochester 519 Arlington Bldg.	Cleveland 415 Cuyahoga Bldg.	Columbus 512 Columbus Savings & Trust Bldg.
Detroit 525 Ford Bldg.	Pittsburgh 2136 Oliver Bldg.	Ft. Worth 212 Lucern Bldg.
Ft. Wayne 502 Bass Block	Kansas City 1001 New York Life Bldg.	

er Automatic Telephone System

PANY—FACTORY AND GENERAL OFFICES **Chicago, Ill., U. S. A.**

years. of three times or more the output of 18 months ago. Back
g No. 3 of this modern plant is a staff having unequalled experience
lo. 4 is in Automatic Telephony.
mmer. This expansion of Automatic Electric Company's plant
ll have mirrors the growing acceptance and demand for Strowger
apacity Equipment, which has won recognition throughout the world as the most modern and efficient telephone equipment.

ASSOCIATED COMPANIES

INTERNATIONAL TELEPHONE SALES AND ENGINEERING CORPORATION, New York.

International Automatic Telephone Company, Ltd., London.
Compagnie Francaise pour l'Exploitation des Procedes Thomson-Houston, Paris
Automatic Telephone Mfg. Co., Ltd., Liverpool
Automatic Telephones, Australasia, Ltd., Sydney.

Missouri Telephone Association Meeting

The Annual Convention Covering Two Days Is Well Attended and the Program Was an Interesting One

PRESIDENT HAUCK McHENRY of Jefferson City called the Missouri telephone men to order for their annual convention on Nov. 15 at the Madison Hotel, Jefferson City, Mo.

A. T. Dumm, president of the Chamber of Commerce in his address of welcome, told of the city's attractions and its pleasure in entertaining the visiting telephone men. He spoke of the important place the telephone held in the business and social life of the country.

J. H. Woods of Canton responded to Mr. Dumm's address of welcome. He expressed himself as always being glad when the telephone business is complimented and then referred to business conditions, declaring that telephone men must have absolute faith in the business and the times that are coming in this nation.

"There is always something doing in the telephone business," said the speaker, and he declared for a broadness of spirit and a belief in other businesses and connecting up with them. It is necessary to have a good spirit and personality, and employes must be of the right kind. In closing, he advocated standardizing the business in rural districts.

J. K. Johnston, of Indianapolis, Ind., then spoke of the organization of the Independent Pioneer Telephone Association of the United States, which he said is growing very fast and has a membership of nearly five hundred.

The question of internal revenue tax on toll messages and its payment was taken up by M. L. Golloday of Holden. The discussion was participated in by J. G. Crane, G. V. Ross, W. R. Journey, G. W. Schweer, and Miss Edith Alley.

The appointments of the following committees was then announced by the chair after which the morning session adjourned:

Nominating: J. G. Crane, Kansas City; Shields R. Smith, Sedalia; R. A. Guthrie, Macon; G. V. Ross, St. Louis; and A. T. Nelson, Lebanon.

Resolutions: W. R. Orthwein, St. Louis; M. L. Golloday, Holden; G. W. Schweer, Clinton; C. W. Boutin, Cape Girardeau; and T. C. Yeager, Canton.

At the opening of the afternoon session Charles C. Deering of Des Moines, Iowa, secretary-treasurer of the United States Independent Telephone Association, addressed the meeting.

"The recent organization of the Independent Pioneer Telephone Association of the United States makes one realize the age of the Independent industry," said Mr. Deering. He spoke on the changes in the operating methods in the industry since the early days. In those days, public relations was not considered of much importance.

"At the present time it is of great importance, and the place to start is with the employes, for they are in direct contact with the public—linemen in setting poles; installers, cashiers, trouble-shooters, all come in contact at various poitns. Advertising and other methods are well worth while and must be pushed.

"During the war the labor turnover was high but the public was patient. The period of readjustment is now with us and every effort must be exerted to meet the problems, of which the education of employes is most important. We must keep our heads clear and use them."

The next speaker was F. B. MacKinnon, Washington, D. C., president United States Independent Telephone Association. He developed the idea that the subscriber seldom knows what he needs and that a man who knows the business, by putting himself into the subscriber's place, can tell at once what he requires. He referred to the practice of the Bell company in having a "subscribers' agent."

On the matter of rates Mr. MacKinnon declared that there are two rate levels—one established by the commission for those who have applied for proper schedules and the other that of companies which are charging the rates of 15 years ago. He outlined the difficulties which these two levels bring up and declared that one of them must be changed—one must go up or the other must come down.

In his opinion, the telephone industry requires a man to represent the companies just as the "subscribers' agent" represents the subscriber. Then those companies that are not charging proper rates would be told of what they need and steps taken to have the needs satisfied.

The speaker pointed out that there are two groups in the telephone industry in Missouri and advocated that the independents should build, in the minds of the public, the idea of these two groups not by emphasizing that there is competition in the telephone business throughout the country but that there is competition as to methods and practices, and that the independents employ what they believe to be the best of these.

Judge Noah W. Simpson of the Missouri Public Service Commission was then presented by President McHenry. Judge Simpson's talk was followed very closely and held the interest of the members. It will appear in a later issue. A rising vote of thanks was extended to Judge Simpson for the address.

The matter of commissions on tolls was taken up by G. W. Schweer of Clinton who expressed the opinion that with the raise in toll rates the local exchange is not getting enough and is in reality losing money. He moved the appointment of a committee to investigate the matter of toll commissions.

M. L. Golloday of Holden thought it best to leave the matter to the executive committee unless funds be provided to make a real investigation. After a discussion a vote was taken and the motion failed to carry. The subject was made a matter of special business at the next morning's session and this was carried, after which the meeting adjourned for the day.

SECOND DAY'S SESSION

The morning session opened with a discussion of commission paid on toll business. G. W. Schweer

stated that the toll companies received an increase in rates and that the local exchanges did not obtain a share of it and that they are entitled to a just portion of it. He advocated the appointment of a committee from the connecting companies and from the toll companies to thrash the matter out.

F. B. Field of Chamois expressed his opinion that toll contracts are individual matters for each company to settle. This was followed by a discussion which was participated in by Mr. Schweer, W. R. Orthwein, St. Louis; Ben Scruggs, Harrisonville; M. L. Golloday, Holden, and Shields Smith of Sedalia.

W. R. Orthwein moved reference of the matter to the executive committee which has representatives of both the connecting and toll companies. The motion was seconded and carried.

J. K. Johnston of Indianapolis, Ind., was then introduced by President McHenry and spoke on the topic of "Making Friends for Business or the Utilities Relation to the Public."

The next speaker was L. S. Gardner, Waco, Tex., secretary of the Texas Independent Telephone Association, who spoke on the subject, "Association Work in Texas." Mr. Gardner dwelt on the greatness of Texas, its resources and its size, after which he outlined the history of the Texas association which has never had a paid secretary or a paid officer of any kind. Its revenues have been derived from dues with the exception of donations which have recently been made.

Mr. Gardner was followed by James K. Wright who gave an illustrated lecture on Missouri which was warmly received.

The afternoon and concluding session opened with a report of the nominating committee. The following officers and executive committee were elected:

President, Houck McHenry, Jefferson City; A. M. Benedict, first vice-president, Richards; S. D. Thompson, second vice-president, Cameron; T. C. Yeager, third vice-president, Canton; A. T. Nelson, fourth vice-president, Lebanon; H. L. Harris, treasurer, Kansas City; M. J. Hancock, assistant treasurer, Kansas City; and G. W. Schweer, membership secretary, Clinton.

Executive committee: S. T. Neill, Clinton; M. L. Golloday, Holden; R. A. Guthrie, Macon; H. L. Harris, Kansas City; H. C. Todd, Maryville; C. W. Boutin, Cape Girardeau; J. A. Hudson, Columbia; W. H. Bassett, St. Louis; and G. V. Ross, St. Louis.

E. L. Chase of Kansas City made the only address on the closing afternoon, "Why Publicity and What the Newspapers Want."

Following Mr. Chase, T. L. Youmans of Osawatomie, Kan., president of the Kansas Independent Telephone Association, extended an invitation to the Kansas convention which is to be held at Topeka, Feb. 9-11.

President Hauck then declared the convention adjourned.

A telephone conversation over 4,100 miles of wire and wireless, said to be a world's record, was held between Avalon, Santa Catalina island, and the steamer Gloucester, 200 miles off Philadelphia.

Interstate Commerce Report on Class A Companies

Operating income of the class A telephone companies increased by over $3,300,000 for the seven months ended with July, compared with the corresponding period of last year, according to the Interstate Commerce Commission summary, while for the month of July there was a decrease of over $350,000 as against the same month last year.

July operating income of the companies amounted to $4,832,000, against $5,189,000 last year, and for the seven month period operating income was $47,275,000, compared with $43,932,000 in 1919. The summary follows:

ITEM	For the month of May		Incr. or decr.*		For the seven months ending with July		Incr. or decr.*	
	1920	1919	Amount	Ratio, Pct.	1920	1919	Amount	Ratio, Pct.
Number of company stations in service at end of month	8,995,707	8,307,609	688,098	8.3	.....	.....	.....	...
Revenues:								
Subscribers' station revenues	$25,072,999	$23,257,911	$1,815,088	7.8	$170,835,658	$143,188,408	$27,647,250	19.3
Public pay station revenues	1,884,367	1,741,934	142,433	8.2	13,531,356	11,453,901	2,077,455	18.1
Miscellaneous exchange service revenues	382,706	362,748	19,958	5.5	2,602,947	2,400,399	202,548	8.4
Message tolls	11,200,211	9,802,929	1,397,282	14.3	77,916,012	62,189,385	15,726,627	25.3
Miscellaneous toll line revenues	1,248,717	1,063,718	184,999	17.4	8,161,607	6,240,682	1,920,925	30.8
Sundry miscellaneous revenues	609,852	418,673	191,179	45.7	3,723,041	2,707,253	1,015,788	37.5
Licensee revenue—Cr.	1,511,384	1,248,946	262,438	21.0	10,042,389	8,132,000	1,910,389	23.5
Licensee revenue—Dr.	1,512,826	1,247,270	265,556	21.3	10,032,494	8,120,033	1,912,461	23.6
Telephone operating revenues	$40,397,410	$36,649,589	$3,747,821	10.2	$276,780,516	$228,191,995	$48,588,521	21.3
Expenses:								
Depreciation of plant and equipment	6,031,823	5,682,439	349,384	6.2	42,267,595	39,068,062	3,199,533	8.2
All other maintenance	6,889,677	6,060,536	829,141	13.7	42,868,562	33,188,483	9,680,079	29.2
Traffic expenses	13,821,270	11,332,674	2,488,596	22.0	85,431,151	63,295,013	22,136,138	35.0
Commercial expenses	4,187,228	3,416,048	771,180	22.6	27,309,980	21,881,629	5,428,351	24.8
General and miscellaneous expenses	1,883,908	1,693,644	190,264	11.2	12,707,691	10,210,168	2,497,523	24.5
Telephone operating expenses	$32,813,906	$28,185,341	$4,628,565	16.4	$210,584,979	$167,643,355	$42,941,624	25.6
Net telephone operating revenue	7,583,504	8,464,248	*880,744	*10.4	66,195,537	60,548,640	5,646,897	9.3
Other operating revenues	4,590	6,881	*2,291	*33.3	34,372	44,370	*9,998	*22.5
Other operating expenses	3,153	4,362	*1,209	*27.7	26,856	31,614	*4,758	*15.1
Uncollectable operating revenues	117,056	300,528	*183,472	*61.0	898,768	1,058,136	*159,368	*15.1
Operating income before deducting taxes	7,467,885	8,166,239	*698,354	*8.6	65,304,285	59,503,260	5,801,025	9.8
Taxes assignable to operations	2,635,337	2,977,225	*341,888	*11.5	18,029,282	15,570,836	2,458,446	15.8
Operating income	4,832,548	$ 5,189,014	*$ 356,466	*6.9	$ 47,275,003	$ 43,932,424	$ 3,342,579	7.6

Reports of Class A Companies for July and the Six Preceding Months, Compiled by the Interstate Commerce Commission.

Public Relations

An Address Before the Recent Convention of the Indiana Telephone Association at Indianapolis

By FRANK WAMPLER
Vice President Indiana Bell Telephone Co.

I HAVE BEEN in the telephone business for more than twenty years, and during that time have enjoyed the acquaintance of practically all the telephone men in Indiana. We have had our contests, which at times have waged bitter. There have periods when we felt it was impossible for us to sit down and discuss the problems of the business, but there never has been a time during all of these years when I could not number among my best personal friends the very men that were my bitterest business competitors, and there never has been a time during all these years when wholesome respect for these same men. We have all made mistakes, but the glorious part of it all is that we have come to realize that we have a duty to perform and are not engaged in a war of extermination; that we are really trying to render telephone service to the public in Indiana, and that there is room for us all. We are bending our energies in that direction, and not to war with each other.

I believe that I have met telephone men from every state in the Union, and I mean it when I say that, in my judgment, Indiana has the best, most conscientious and efficient telephone men in the United States. The friendship of an associate in business to me is worth more than money. I would not exchange the friendship of you telephone men for all the money. I am proud to be associated with you. The spirit of proper public relations should begin at home. Fair and proper relations must exist in our telephone family first. That condition we now have, and let us keep it.

It is my understanding that this session is to be devoted to a general discussion of public relations. Your program committee has requested me to start that discussion.

What is public relations? One has said that it is, as the name implies, a maintenance of proper, cordial, fair and friendly relationship between the company and the public it serves. I think we can all subscribe to this definition, and we can all agree that without proper public relations success is impossible.

Experience has taught me to have a most wholesome respect for the power of public opinion. It is the most compelling force in the world. Oliver Wendell Holmes has well said that "It is not so much

FRANK WAMPLER.

where we stand as in what direction we are moving. We must sail, sometimes with the wind and sometimes against it, but we must sail." In the matter of public relations, are we sailing in the right direction, or are we drifting toward the rocks?

In these times a great deal is being said on the subject of public relations, and it almost requires a second thought to realize that it is not a new subject. The principle for maintaining proper public relations is as old as the hills, and so simple that it does not need special treatment.

The telephone business is, to a greater extent than any other utility, dependent for its success upon the maintenance of amiable relations with the public, and, therefore, unusual stress has been laid upon the work of those whose business it is to preserve an atmosphere of reciprocal respect and confidence.

Great minds are bent to the study of business psychology, and tremendous things have been accomplished by its proper application, but the psychological genius who can produce an amiable state of public mind in the face of inadequate service has not been born.

The service we sell is the foundation upon which our relations with the public must rest. Any want of full measure in service and our public relations cannot be good, and no preachment that we can indulge, in finely phrased excuses, will disarm public hostility if the goods are not being delivered. Policy must be based on service, and not service on policy. We should be guided by the rules of a fixed general policy adjusted to the Golden Rule. Any line of policy attuned to a less exalted rule will fail you under the scrutiny of the sharp eyes and keen ears of the thousands who have you constantly under inspection, who will be quick to detect any attempt to take advantage of an artificial excuse for delivering something less than that contracted for. Remember that the other party to your contract is a human being just as you are, susceptible to the same influences and quite as little disposed to render good for evil. In our business it won't do to simply give him a number and thereafter treat him as a producing unit.

The number of customers runs into the hundreds and thousands, and it is therefore not possible for you to deal specifically with each individual who has a grievance, but it is of tremendous importance that proper personal contact be had with every aggrieved customer as far as it is physically possible to do so.

In this way you can do much toward humanizing a great business. Look out for leaks in the system and stop them with a human plug when and where you can. If you don't do this, the most carefully devised system will break down and wreck your honest and well intentioned policy against the breakers of a stormy public opinion.

Most of us have lived long enough to know something about human nature. It is astonishing, however, that we do know so little about this one thing with which we should be, by all rules, well acquainted. Some have even gone so far as to try to change human nature; some have attempted to improve it; some have tried to fool it; others, in their dealings with their fellow men, have attempted to assume an attitude that was not natural to themselves. All of these have failed. The most the world expects of you is to be a natural human being, and reflect that same spirit in the management of your utility. So if these thoughts apply to the individual for his success, then the same principle must apply to the utility, because the utility must develop a personality in its dealings with the public based on the same fundamentals that would apply to the individual.

You can minimize the danger of arousing public antagonism by putting personality into your service. A wise man has said that personality is conveyed in action and is not interpreted in sound. The public demands definite things. Promises are not definite things. In your dealings with the public always make it evident that the telephone is for the most part a human device, susceptible to the frailties of humanity, but that it is operated with a proper regard for the rights of each individual and that you are strong for maintaining those rights. Don't barricade yourself behind forms and set rules, but get into the open and by action show your customer that you want to be right and then practice what you preach.

Any well organized system must rest upon efficiency, but in the name of efficiency many a goodly commercial and industrial adventure has gone to pot. Beware, for the howl "efficiency" may be the shibboleth of the inefficient. Many proclaim it so loudly as to drown the warnings of experience.

I am for the efficiency expert as far as he goes, whatever his particular line. He should be fitted into his appointed place in the system where he is useful, but you must be on the look-out for sound individuals with sound common sense to conduct the general affairs. The efficiency expert has his place, but it takes executive ability to run your business.

The maintenance of a proper public relation rests entirely upon your ability to maintain a high standing in the community where you do business. Be he your customer or not, meet your fellow man as another human being. Give a dollar's worth of goods for every dollar paid to you. Maintain such contact with your customers that they will know they are getting value received. Stand ready at all times to render efficient and dependable service. Do these things and you need be under no apprehension that the public will not meet you more than half way in a spirit of co-operation for the accomplishment of all things necessary to the success of the most human institution in the world today—the telephone.

Operators' School at Springfield Convention

W. S. Vivian of the Automatic Electric Company, Chicago, conducted the operators' school held in connection with the recent annual convention of the Illinois Independent Telephone Association at Springfield. Some forty operators were present and the meeting was a most interesting one.

Through courtesy of D. C. Faber, director of the engineering extension department of the Iowa State College, copies of the methods, phrases and codes compiled by Miss Ann Barnes were distributed and discussed during the sessions.

"What a Long Distance Operator Ought to Know," a book published by the Michigan Independent Telephone & Traffic Association of Grand Rapids, Mich., was used by Mr. Vivian as a textbook. The three miniature switchboards used for demonstrating the work, were furnished through the courtesy of the Kellogg Switchboard and Supply Company, Chicago.

Mr. Vivian made an address on an operator's understanding of her obligations to the company, the public and herself. He emphasized the necessity for vision and teamwork and the value of system and rules.

"While these things are important it is of even greater importance to radiate good cheer, friendliness, sympathy and encouragement. To be helpful, loyal, reliable and efficient in our work should be our aim.

"If each one of you has the proper vision of your responsibility in furnishing a service that is satisfactory to your subscribers and patrons, you will not only make strict application of the operating rules, but you will be energetically and determinedly pressing these things which are the spirit of the rules. You will leave your personal troubles and ailments at home. If you have a headache or a grouch, you will not pass them on to either your companions at the office or your subscribers.

"Resolve, as you return to your homes from this convention, to make each day bigger and better than the day before. In so doing, you will find that as you use your talents and opportunities in these directions, they will devolp and increase, and you, and others, will be happier because of your so doing."

Before the meeting adjourned it was decided to hold several additional meetings for operators in different parts of the state during the present year.

The Value of the Telephone Girl

A proficient telephone operator is worth $1,000, according to William D. Banks, chief counsel for the Chicago Telephone Company. He made the statement during an argument on valuation of the company's property, before the state public utilities commission. He estimated it cost his company $8,000,000 to train telephone girls for the Chicago district. The telephone girl who a few years ago received $6 a week now receives from $20 to $25, according to Mr. Banks.

Alice In Numberland

A Whimsical Travesty on Lewis Carroll's Masterpiece Told With a Telephone Twist. By Courtesy Telephone and Telegraph Journal, London

By J. M. McMILLAN
(London Telephone Service)

ALICE had got very tired of sitting by her sister on the bank. The patches of sunlight seen through the trees dazzled her eyes, and the faint whir of drowsy insects, the far-off sounds of sleepy birds, and the drone of honey-laden bees, made her feel so sleepy that her head sank lower and lower, till finally her eyes closed altogether, and she slept. What was it that awakened her! She sat up suddenly. Her sister had disappeared, but a voice was ringing in her ears, and the words "Career for Girls" seemed to be vibrant in the air. Why, that was what her father had been talking about last night. She looked round her quickly, but no one was in sight except a white rabbit, and at this moment he scuttled down a hole. "Well," said Alice, "I can't sit here alone any longer. I shall follow him." So without further words she hurried after the rabbit, and flung herself breathlessly down the hole.

After floating steadily downwards for a few minutes, she found herself standing at a tall door, the handle of which was quite out of her reach. She looked through the window, and saw a number of girls sitting happily together, with such pleasant faces that lonely little Alice stretched out her arms to them, but they did not seem to see her. "May I go in there?" she said timidly to the rabbit, but he only grunted out something which sounded like "Five feet in height without shoes." "Oh, dear," mused Alice, "how vague everything seems to be, and yet I am sure there is a meaning in it somewhere. But I do feel so hungry." "Have a biscuit," said the rabbit, holding out several to her. Alice noticed that they were numbered 13, 14, 15 and 16. She took them gratefully, as she finished each one the rabbit muttering, "Thirteen years of age, fourteen years of age, fifteen years of age"; then, when she had eaten the fourth, he said briskly, "That's right. You are now sixteen, and the right height to go through the door. Is your enunciation good," he asked sharply; and then, with a frightened look at the heavy frown with which her answer was received, she hurriedly turned the handle, and entered.

A hum of many voices smote upon her ears. Strange words floated towards her. "Opal codes; answering jacks; subscribers' multiple"—"What *can* it mean?" said perplexed little Alice. But before she had time to wonder long, several of the girls shouted out, "Are you calling?" "Why, of course I am," said Alice indignantly, "but you should say 'How do you do' when anyone makes a call." This answer was greeted with loud groans and cries of "Ring off." "Certainly not," said Alice; "father gave me this ring for my birthday." At this moment a lion came up to her. "Give the password," he said sharply. Alice answered hurriedly, "Number, please?" and was astonished to see a look of approval on the lion's face. Why she had said these words she could not think, but they were apparently the right ones, and she was told to step forward, and see whether she could recite. Try " 'Tis the voice of the sluggard," said the lion briskly. Alice felt rather nervous, as by this time all the girls were looking at her, but she began at once, though the words sounded strange in her own ears:—

'Tis the voice of the sub., and I heard
  him complain,
"You have given me sev'ral wrong num-
  bers again.
I know I said '4' when I really meant '2,'
But my thoughts should be clearly trans-
  parent to you."

At this juncture the lion showed marked annoyance, so Alice continued hurriedly:—

As one in a fury, so he on the line,
In accents of thunder his lot does repine;
But when to Exchanges they pilot him
  round,
His voice has a timid and tremulous
  sound.

"Dear, dear," growled the lion, "this will never do. You will never be allowed to stop here if you say things like that—although there seems to be a certain amount of sense in it," he added, thoughtfully. "However," he said more kindly, as he saw how crestfallen Alice looked, "try 'Will you walk a little faster, said the whiting to the snail.'" Alice felt her memory was not all that it should be, but she began bravely enough:—

"Will you work a little faster?" said the
  sub. to the teleph.
"I've asked you twice for Hop Ex-
  change; you really must be deaf.
I'm sure you must have seen my little
  indicator drop;
Will you, won't you, will you won't you,
  will you give me Hop?
Will you, won't you, will you, won't you,
  won't you give me Hop?"

"You're not the only sub," the little
  maid soliloquized;
She dared not say it loudly, as it wasn't
  authorized.
"What number did you call?" she asked.
  The sub, without a stop,
Said, "Will you, won't you, will you,
  won't you, will you give me Hop;
Will you, won't you, will yo won't you,
  won't you give me Hop?"

The lion was now extremely angry. "You really ought to leave here at once," he said severely, "but you shall have one more chance. Every child should know that beautiful ballad, 'I'll tell thee all; I can no more.' Let us hear you say it now." Alice dared not disobey, as the lion looked so fierce, and everyone was waiting for her to begin. She started tremblingly, her voice gathering strength as she proceeded:—

I'll tell thee everything I know;
  There's little to relate.
I saw a youthful journalist,
  A-sitting on a gate.
"Come, tell me, Truthful James," I said,
  "How is it that you live?"
And his answer trickled through my head
  Like water through a sieve.

He said, "I gather subs.' complaints,
  And headlines vivid quite,
And work them into lurid columns
  In the silent night.
And as we only print one side,
  It matters not a bit;
If someone writes to say we're wrong,
  We do not publish it."

But I was thinking of a way
To get the public ear,
And teach them to co-operate
And keep their judgments clear.
I shook him well from side to side,
Until his face was blue;
"Come, tell me, Truthful James," I said,
"What is it that you do?"

He said, "If evidence comes in
That proves the service good,
I quickly show that white is black,
As any pressman would.
And if it can't be twisted round
As most I would desire,
Why, isn't it an easy thing
To throw it on the fire?"

I heard him them, for I had just
Completed a design
For getting all offending subs.
To pay a heavy fine.
I thanked him much for making clear
Just how he wrote his news,
But most of all for giving me
Such fair, unbiased views.

And now when I a paper see,
It is my simple creed
To get a lot of table salt
And sprinkle all I read.
And when between the paragraphs
I find the Hymn of Hate,
I weep salt tears of bitterness,
For once again I see him—yes,
That agent from the yellow press,
In modest, unassuming dress,
And hear his tones of tenderness,
Which seemed to breathe a fond caress,
As his black deeds he did confess,
Full twenty years ago, I guess—
A-sitting on a gate.

There was much unseemly applause from the girls at the conclusion of this effort, which was too much for the lion. "Your time is up," he said fiercely, and then, as Alice turned to go, a voice said "Trunk call for Alice," and she saw, waiting outside the door, an elephant. She ran out, and he put his trunk fondly round her waist. "This way," he said, kindly, and Alice felt herself led along a path until she reached a large building, to which many colored threads were running. At the door of the building, she saw, in letters of gold, the words:—

"To these, in vision clear,
The aspiring heads of future things appear,
Like mountain-tops whose mists have rolled away."

They seemed to burn and gleam in the soft air, and suddenly Alice felt that here, and here only, would she get at the real meaning of all these puzzling things. She turned to the elephant. "What does it mean," she said, softly; "may I go in there?" "One day," he said gently, "not yet; but you may look through the window." He lifted her until she could see in the room. There were a number of girls sitting holding in their hands what were apparently the other ends of the threads which Alice had seen outside the building. They were gold, and blue, and silver, and, many other beautiful shades. "These girls are supervisors," murmured her guide, "they have *super* vision—a vision far superior to that of ordinary mankind. By it they are enabled to see right into the minds of those who work for them, so straightening out all kinds of little human difficulties. Sometimes a girl comes looking cross and dispirited; sometimes disillusionment is plainly shown, or anxiety of mind—all fatal to good working. Sometimes on a hot day, or when a sudden rush of work comes, when to highly strung minds the tension is greatest, the sudden thought of this *super* vision comes gratefully to harassed minds, and changes the blackest thread of thought to a radiant one, and the calls seem not so numerous after all, and the callers less tiresome. For thought is a force, little Alice," he went on gravely, "no one has yet fathomed the effect of mind on mind. Is our influence benevolent—or sinister? Could we follow the unseen influence of our thoughts, should we smile—or shudder!" The elephant now appeared to be looking into the only dark corner of the room. Alice followed his gaze. There, huddled together, were a few girls. These also were holding threads, but in their slack hands they seemed to be sombre and lifeless, some of them tangled, many of them broken and useless. "What are those," said Alice softly. "They are those," he said, "who have not yet learned 'to overcome by other ways than steel.'" Then, seeing the tears in Alice's eyes, he said, "They are very few now, and will gradually disappear. Now, come," he said more briskly, "I will ask the Gryphon to recite to you before you go." Alice thought she had heard quite enough for one day, but she did not like to refuse, so she listened as patiently as she could. The Gryphon started at once. "The title of it," he announced, "is out of print at present." And this was the rhyme:—

The moon was shining cheerily,
Shining with all its might.
It did its very best to make
The London streets look bright.
Which wasn't odd, because, you see,
It was a Friday night.

The girls in the Exchanges grim,
Their voices soft and low,
So musical and sweetly pitched,
Were sitting in a row.
And no one knew, when work was done,
Just where those girls would go.

The President and Treasurer,
Were walking hand in hand.
They wept like anything to see
Such talent in the land.
"If we could have a mammoth choir,"
They said, "it would be grand."

"If we should hire," the President
Remarked, "a hall quite near,
Do you suppose, from all of those,
That twenty would appear?"
"I doubt it," said the Treasurer,
And shed a bitter tear.

"I weep for you," the President
Observed, "and sympathize.
But I shall hire a hall myself,
And watch the numbers rise."
The Treasurer said nothing, but,
"I fear it's hardly wise."

But soon four candidates appeared,
And then another four,
And thick and fast they came at last,
And more and more and more.
All hurrying to Rangers' Hall,
Their spirits brimming o'er.

They came so fast, this gath'ring vast,
Their numbers grew apace.
First trebles, altos, tenors, then
A modicum of bass.
"I told you so," the President
Exclaimed, with smiling face.

"The time has come," the Treasurer said,
"To talk of many things.
Of what our humble aim shall be,
And if, when fame it brings,
We'll take the Albert Hall, and seek
The patronage of kings.

And when our name has spread abroad,
To hear us men will thirst,
And then on an astonished world,
Like meteors we'll burst."
The President said nothing but
"We'd better teach them first."

"Do you suppose," the Treasurer said,
"That such a one there'll be,
Who'll offer to conduct the choir,
Foregoing any fee?"
"I know one," said the President,
"Monsieur Marelyn,—'tis he."

The Secretary, shy, *petite*,
Her eyes with fervor lit,
Said, "If there's much hard work to do,
I'll gladly welcome it."
The President said nothing but
"I do admire your grit."

So everyone in gladsome mood,
About a thousand strong,
Came regularly, week by week,
For practice short or long,
Which wasn't odd, because, you see,
'Twas "Hiawatha's Song."

The President and Treasurer
Were standing side by side,
They looked upon the choristers,
And both were satisfied;
And the conductor smiled, and viewed
His work with honest pride.

"Oh, Choristers," they all exclaimed,
"Your fame is spreading still.
Will you go on from height to height,
And climb from hill to hill?"
The choristers said nothing but
"We will, we will, WE WILL!"

At the conclusion of this recitation, Alice again felt herself lifted up gently. The motion was so pleasant that she closed her eyes, and then, as the movement ceased, she opened them again—to find that she was again sitting on the bank, with her head against her sister's shoulder. "You have been asleep quite a long time," she said. Alice smiled wisely, saying, to the obvious amazement of her sister, "Anyway, I know what I am going to be directly I am five feet in height without shoes!"

Ten Commandments

1. Answer the telephone immediately. Two percent of all the calls that are made are wasted because the party calling gets impatient at delay and hangs up.

2. Eliminate the waste of words that results from saying "Hello." Avoid preliminaries by announcing your name or that of your department or company. On answering the bell say, "Mr. Blank speaking."

3. Every call deserves prompt attention. If you are not the one wanted get the right person. If he is out of the office offer to take the message.

4. Have a pad and pencil always ready. Don't keep the caller holding the line while you search.

"I'll TELL YOU, MABEL, WHEN I SEE YOU"
YES, I'M AT THE OFFICE AND MUST BE HERE UNTIL LATE"
"SHE SAYS TO ME, FLO AND THIS IS BETWEEN ME AND YOU"
"THEIR ENGAGEMENT TO BE A SECRET SO BE CARD PARTY, GEE!"
THIS BILL IS STRICTLY ADVANCE INFORMATION"
"PLAY HIGH FLYER TO WIN, SHE'S SURE."

This Is How Batchelor, Cartoonist of the Washington Times, Pictures the Telephone Operator, Whom He Describes as "The Confidante of Our Hopes and Fears."

5. Speak with courtesy. Remember that you are not face to face and therefore cannot soften the effect of a harsh voice by showing a winning smile.

6. Try to visualize your man at the other end of the line. Keep your voice cordial. Concentrate on the business at hand.

7. Don't try to save a minute at the other fellow's expense.

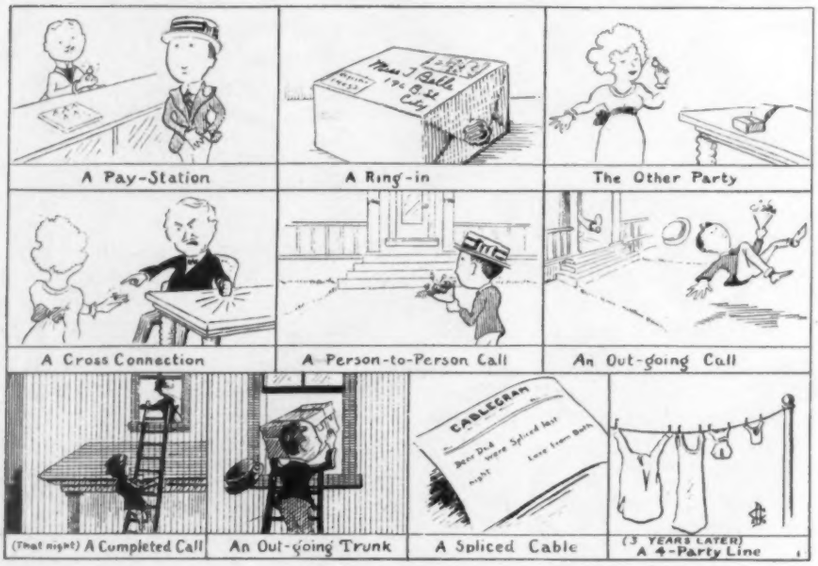
8. If in calling you are given a wrong number bear in mind that the person who answers is not to blame. He should be given the same treatment you would accord him if you walked into his office in error. To help avoid such mistakes always know the number; do not guess. Don't jiggle the hook to recall the operator. When you turn the light on and off too rapidly, like any other electric bulb it may not glow. Move the hook up and down slowly.

9. In asking for your number pause slightly between the hundreds and tens. This helps the operator, for the numbers are arranged on the switchboard by hundreds and tens.

10. Never forget that during a telephone talk you are the sole representative of your company to the person on the other end of the wire. —*The Mountain States Monitor.*

Romance of a Telephone Belle

From Telephone Topics



N. E. Indiana Telephone Meeting

One of the Most Successful Conventions in the History of the Association Was Held at Ft. Wayne, November 16, 1920

By MARTIN UMBACH

THE third quarterly meeting of the Northeastern Indiana Telephone Association was held in Fort Wayne, Indiana, November 16, 1920, and was by far the most successful, not only in point of attendance, but also in the offering of information and technical advice, valuable to every telephone man, held during the year. W. E. Bowers, president of the association, acted as chairman, opening the meeting by welcoming the members and briefly outlining the order of the day's business.

Professor Wright discussed "Testing Methods." As master of detail, he showed, in a series of illustrations, the fundamental principles in determining electrical resistances and locating faults and disturbances on telephone lines and circuits, such as grounds and crosses, and also the proper instruments and apparatus used for this purpose, such as the voltmeter, ammeter, galvanometer, the Wheatstone bridge, and others, all of which were graphically described and theoretically explained by him. As a decided advantage for his audience, Professor Wright had his talk, as well as an illustrated pamphlet, showing his verbal explanation in detail, mimeographed and distributed among them, in this way making it of permanent benefit to them, in that they can refer to it in the future, if they desire.

The afternoon session opened with an illustrated talk on "Traffic Records" by E. L. Gaines, traffic superintendent of the Home Telephone & Telegraph Company, Fort Wayne, Indiana, by means of charts, showing traffic studies for exchanges of various size. He showed that while the traffic loads vary somewhat as to time and volume during the day in the different towns, the fact remains that the variations in traffic can be depended upon as occurring regularly every day in every exchange, large or small, and for this reason a systematic record should be kept by every telephone exchange to determine the particular variations in the traffic loads during the day in each exchange. Every exchange should pay particular attention to the making of traffic records. Not only will these records show the amount of business accomplished during each day, but they also are necessary to regulate the amount of help required to take care of the business properly during the hours showing the heaviest loads as well as those showing the lightest loads.

The interest shown by the audience during Mr. Gaines' illustrated talk is proof that this subject will be given more attention in the future by the telephone managers in this section.

Following Mr. Gaines, M. D. Atwater, director of service of the Indiana Public Service Commission, was introduced by the chairman.

Mr. Atwater is favorably known throughout Indiana as an interesting talker and one of the best informed authorities on matters pertaining to public utilities in Indiana. "Service," Mr. Atwater pointed out, should be the keynote of every successful telephone company, and the subscribers and the public should receive full value for what they pay for. On the other hand, prompt "service" should also be given the telephone company by the public, in so far as payment of telephone bills are concerned. Prompt payment of bills should be enforced by every telephone company, and the public should really pay for the extra expense of collecting from slow and chronically delinquent subscribers.

Picking out at random a few statistical facts in connection with the public utility development of the past year, Mr. Atwater showed that the telephone industry compared very favorably with any other utility of the state, both as to new equipment installed and new improvements made, as well as in the amount of taxable property. Contrary to general belief that the rebates allowed the public by the commission on account of poor service and for other reasons, was very large, Mr. Atwater stated that the rebates allowed last year by the commission, including all utilities in the state, amounted to only $269.25.

At the conclusion of Mr. Atwater's address, F. V. Newman, manager of the LaPorte Telephone Company of LaPorte, Indiana, discussed, in an animated manner, the necessity of united effort on the part of the Independent telephone companies of northern Indiana for the improvement and extension of toll line facilities across the northern part of the state. As chairman of the northern Indiana traffic committee, which has as its object the betterment of traffic conditions in the northern part of the state, he urged co-operation of the different toll line companies and outlined the work to be done in order to improve the toll service. The first requirement necessary, Mr. Newman pointed out, was the preparation of a complete and comprehensive toll circuit map showing every available circuit, together with such other information which will enable the committee to furnish routing instructions and also recommend such changes and improvements necessary to insure first class toll service between the various towns in northern Indiana. This matter has been taken up by the committee and Mr. Newman expressed the hope that with the proper co-operation his committee would be able to accomplish the things it has in mind and be successful in its efforts to improve and increase the toll traffic throughout the northern part of the state.

The discussion which followed Mr. Newman's talk proved conclusively that the members were greatly interested in the work of the committee and that it would, no doubt, have the co-operation of every toll line company in the northern section of the state.

The Telephone Receiver

A Non-Technical Description Showing the Function of the Receiver. Courtesy of The Transmitter

By G. L. WELLER

THE telephone receiver, in its operation, is the same today as when first introduced to the public. Many types of receivers have been developed, but, for various reasons, they have failed to measure up to the expectations of their designers and have not been extensively used. The single pole receiver first came into general use and gave satisfactory

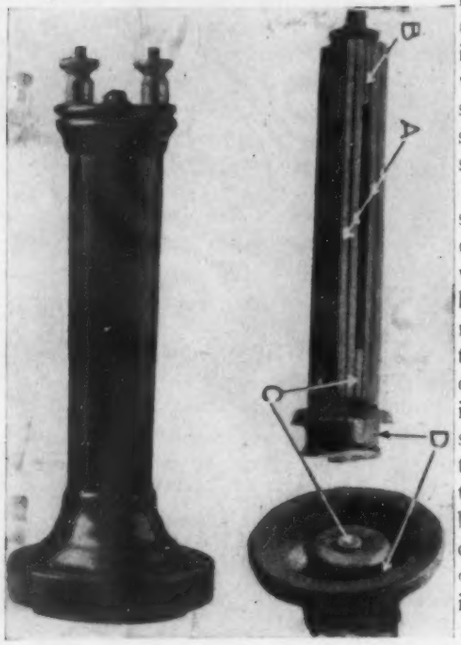


Fig. 1.

service for a number of years. Next the double pole or bipolar receiver was developed and is now used exclusively for commercial work.

Figure 1 shows a single pole receiver which was one of the first used by operating companies. The compound magnet "A" consists of two pairs of permanently magnetized steel bars with like poles adjacent. At one end the magnets are connected by the soft iron block "B" and the other by the soft iron pole piece "C." The pieces B and C are made of soft iron in order to complete the magnetic circuit between the steel bars "A."

On the end of the soft iron pole piece is placed the coil "D," through which the current in the telephone circuit passes. Any variation in the current passing through this coil will either increase or decrease the strength of the magnetic pull of the pole piece "C" on the diaphragm and cause the diaphragm to vibrate in unison with the diaphragm of the transmitter, which is varying the current in the circuit. The vibrations of the diaphragm set the air surrounding it in motion in the form of sound waves. It is these sound waves striking the ear which makes it possible for one to hear what is being said at the distant end.

This receiver gave satisfactory service, but it also had its inherent defects, the most serious one of which was due to the shell which held the diaphragm; being of hard rubber, it did not expand and contract the same as the metal parts of the magnet with the variations in temperature. It can readily be seen that when adjusted for a given temperature the distance between the pole piece and diaphragm would be more or less as the temperature changed. These variations would cause appreciable losses in receiving.

While speaking of sound waves it is well to understand that the sense of sound is not caused by the particles of air, in actual contact with the sounding body, traveling to the ear. The air is set in motion by the sounding body in the same manner that water is set in motion when a stone is thrown into a pond. The stone, when striking the water, throws the particles aside where it enters, sets them in motion and at the same time starts the adjacent particles vibrating.

Successive particles set the adjoining ones in motion until the energy dies out or the shore is reached and no further particles are there to receive the vibrations. Sound waves travel from the receiver to the ear in the same manner.

The double pole or bipolar receiver was developed later and the type now in commercial use is shown in Fig. 2. The double pole is the same in its operation, but is more sensitive than the single pole receiver.

In Fig. 2 (a) is the permanent magnet, (b) the diaphragm and (c) the magnet coils. The trouble experienced with the earlier receivers, due to unequal expansion of rubber and metal, has been eliminated since all parts having to do with the adjustment are made of metal.

The receiver is also a magnetic transmitter and has been used as such. If sound waves strike the diaphragm they will cause it to vibrate in the same manner as the diaphragm of a transmitter vibrates.

These vibrations cause a variation in the air-gap between the pole pieces and diaphragm and vary the amount of magnetism passing through the cores. The variations in magnetism set up alternating currents in the circuit in which the coils are connected, cause current

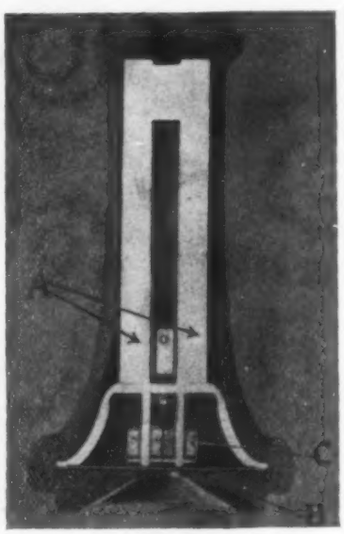


Fig. 2.

to flow over the line and actuate the receiver at the distant end.

The magnetic transmitter (the present day receiver) is capable of reproducing speech more accurately than most of the variable resistance transmitters, but was abandoned

for commercial work as a transmitter because the currents generated by it were too feeble. It may be used more frequently in the future than at present due to developments in the art.

In addition to the receivers described above there have been various other designs used. A number of multipolar receivers have been developed, but they have not shown sufficient gain in efficiency to warrant their use.

Receivers depending upon power from an outside source (electromagnetic receivers) have been in use. The efficiency of these receivers has been impaired where the current supply has varied. When used in connection with common battery service and obtaining their magnetizing current over subscribers' loops of uniform resistance it may be that electromagnetic receivers will come into more general use.

The receiver is permanently adjusted before leaving the factory and should not be adjusted or repaired in the field. If a defective receiver is found it should be replaced by one known to be in good condition.

Ohio Bell Buys Central Union

Stockholders of the Cleveland Telephone Company authorized an increase in the capital stock from $6,000,000 to $30,000,000 to provide for the purchase of the exchanges and toll lines of the Central Union Telephone Company in Ohio, according to Robert G. Pate, general manager of the Cleveland company.

The stockholders also approved changing the name of the Cleveland Telephone Company, an Ohio corporation, to "The Ohio Bell Telephone Company."

The Central Union is an Illinois corporation. Its property extends through 72 of the 88 counties of Ohio and it operates exchanges with 170,000 stations in 66 cities and towns, including Columbus, Toledo, Dayton, Youngstown, Springfield and Zanesville. Its toll lines connect with all important points operated by independent companies throughout the state.

The necessary amendments to the articles of incorporation of the Cleveland Telephone Company will be filed at once with the secretary of state and within a few days the entire plan will be submitted to the state public utilities commission for its approval. It is planned to consolidate the two companies.

Telephone Company Objects to Parallel Power Line

The American Telephone and Telegraph Company recently filed a bill of complaint in the District Court of the United States, northern district of Ohio, seeking to enjoin the Cleveland Electric Illuminating Company from constructing a proposed power transmission line along Libby Road, Warrensville township, Cuyahoga county, Ohio. The proposed location of the power line was on the opposite side of the highway from the long distance line of the American Telephone and Telegraph Company with a separation of about thirty feet. The parallel extended for a distance of two and one-half miles and on Center Road for a distance of three-fourths of a mile. The separation between the two lines on Center Road would be about eleven feet. The telephone company maintains that if the power transmission line were constructed as proposed, the service rendered the public would be seriously interfered with and made unreliable for commercial use by induction, and that there would be a possibility of physical contact between the two lines transmitting the high pressure voltages to the telephone company's circuits resulting in the destruction of cables, switchboards, buildings and other apparatus and imperiling the life of complainant's line employes, switchboard operators and patrons.

While it is the established law in many states that power transmission lines must be so constructed and maintained so as not to interfere with the service and plant of telephone and telegraph companies having prior rights, this question has not been directly passed on by the Supreme Court of Ohio and this case will be watched with much interest by telephone, telegraph and power interests in Ohio.

Pennsylvania Telephone Traffic Meeting

The annual convention of the Pennsylvania State Telephone and Traffic Association will be held in the Penn-Harris Hotel, Harrisburg, Pa., Jan. 6, 7 and 8, 1921. These dates have been sanctioned by the United States Independent Telephone Association.

This meeting will by far, excel all former ones, both in interest and in attendance. The changed conditions due to the passage of the Telephone Act of 1919, brings to the telephone companies important questions which must be considered most carefully. No company can afford to be indifferent to the bearing these changed conditions will have upon the telephone business. All of these questions will be brought before this convention. They will be discussed and analyzed by men who have made a careful study of the telephone situation, not only in Pennsylvania but in surrounding states.

Five of the largest manufacturers of telephone apparatus have reserved space for exhibits and additional reservations are coming in. The officers of the United States Association will be present and some of the best speakers on public utility matters have been secured.

Beet'es Ruining Telephone Cables in California

When telephone girls in California find their wires "shorted" a bug may be on or in the wire, for California has a wood boring beetle that goes through wood and also through alloyed substances considerably harder than lead. The beetle has put hundreds of telephones out of commission by boring holes in the cables that carry the wires. Water enters the cables, making wire connections useless until the bored places are found and repaired. The problem of control of this metal-boring beetle is still unsolved, according to the bureau of entomology of the United States department of agriculture, and it will be difficult to find a practicable way.

The Magnavox Anti-Noise Airplane Telephone

A Chronicle of Its Invention, Its Development, Its Use by the United States Navy and Its Peacetime Commercial Applications

*By EDWIN S. PRIDHAM and PETER L. JENSEN.**

THE Magnavox Company of San Francisco, during the summer of 1917, was approached by Lieutenant Commander C. G. Sweet of Mare Island Navy Yard with the request that the company devote its engineering and development experience and its laboratory facilities to the solution of the problem of intercommunication on board airplanes and seaplanes. Lieutenant Commander Sweet at that time had knowledge of work done previously by the Magnavox Company in special telephone development, and particularly of the pioneer work done by the company's engineers with an exceptionally powerful sound-amplifying telephone receiver known as the "Magnavox Telemegafone"—the most powerful instrument extant of the class known in telephone parlance as "loud-speakers".

It was the belief of the naval men that the use of this instrument on board airplanes would solve the problem of intercommunication among the crew.

The first tests were carried out at the Hall-Scott Motor Co.'s plant in Berkeley, Calif., where several airplane motors were being tested "on the blocks" and were running simultaneously at full speed. Careful observation of results, under these conditions, immediately made it apparent that the problem could be solved only by making the telephone transmitter insensitive to the noise of the motors, retaining at the same time its ability to transmit the human voice efficiently.

* Engineers, The Magnavox Company, Oakland, Calif. 6pt ftnte

NOISE "EXCLUDERS" FAIL

The first attempts in this direction were in the line of trying to prevent the interfering noises from reaching the diaphragm, and to allow the voice alone access to the transmitter. These attempts proved futile. Inches of felt, rubber and cork, wrapped around the transmitter, were penetrated easily by the terrific noises produced by the motors, and the voice was still completely obliterated.

During the month of July, 1917, an entirely new form of telephone transmitter was developed by the writers. This transmitter immediately solved the problem at hand—obviously to the satisfaction of the navy department, since it was adopted shortly afterward as the navy's standard, and during the war was used on all navy seaplanes, and later on the N. C. flying boats that crossed the Atlantic Ocean.

HOW IT WAS DONE

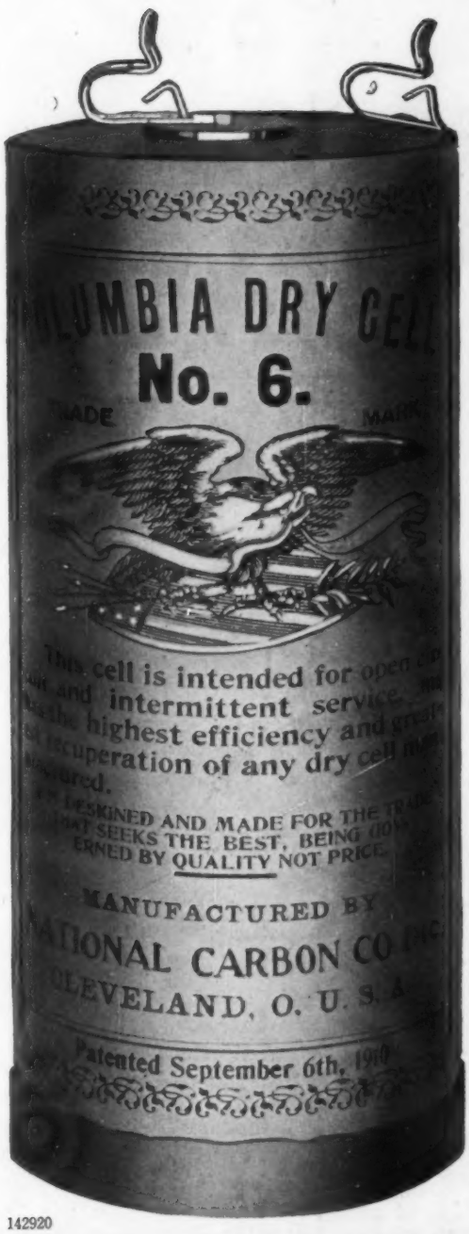
Having failed in all attempts to exclude interfering noises from the transmitter, it was decided by the writers to try the other extreme; i. e., to give extraneous noise free access to both sides of the transmitter diaphragm. It was the

Type B-Z Showing Anti-Noise Transmitter.

* Engineers, The Magnavox Company, Oakland, Calif.

Columbia Telephone Cells

"less cost per day of service"



The long life of Columbia Gray Label Telephone Cells is in a large measure due to the fact that they remain *absolutely* idle when not working. Every telephone man knows that this means less cost per day of service. Fahnestock Spring Clip Binding Post without extra charge.

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In Canada: Canadian National Carbon Co., Ltd., Toronto

writers' belief that if the interfering sounds were permitted thus to strike both sides of the diaphragm with equal force, the diaphragm would remain at rest; and that if the voice of a speaker were then directed against one side of the diaphragm, it would vibrate only to the impact of the voice waves.

This belief, when worked out and

This Airplane Transmitter Crossed the Atlantic in the N. C. 4.

subjected to laboratory trials, proved to be correct, and the Magnavox "anti-noise" transmitter, developed as a result of these trials, soon reached the stage where it was ready for the severe service required.

SUBMITTED TO NAVY

In the fall of 1917 the Magnavox anti-noise transmitter was submitted to the navy department for its approval. With the transmitter, the company submitted a complete airplane interphone set, consisting of aviators' helmets with telephone receivers incorporated in the earcaps, and a battery and switch box.

This telephone set, as a whole, exclusive of the transmitters, was quite crude, as the Magnavox Company lacked knowledge as to the actual conditions existing and the requirements to be met. Notwithstanding this, however, and on the strength of the exceptional noise-overcoming properties possessed by the Magnavox anti-noise transmitter and the encouraging results obtained under tests of this first crude set, the navy department awarded the Magnavox Company a contract for three hundred four-station interphone sets and three hundred two-station interphone sets, each set having five-station and three-station boxes respectively, and each set being fully equipped with helmets and transmitters.

AFTER-THE-WAR USE OF ANTI-NOISE TRANSMITTERS

The anti-noise transmitters used on Magnavox commercial and marine telephone apparatus are identical in principle and construction with the transmitters that revolutionized communication in the air and overcame the thunder of the 400-horsepower Liberty motor. The only difference is in the form of mounting.

Instead of a trumpet-shaped mouthpiece, the transmitter has before the diaphragm a perforated disc of bakelite. The user speaks with the lips almost touching this cover disc.

Numerous tests on lines of varying length have shown that, with the speaker's lips actually touching the cover disc, the Magnavox anti-noise transmitter on the Type B-2 desk telephone is equal to the most sensitive mouthpiece transmitter of the old enclosed or "solid-back" type; and that, with the lips one-eighth of an inch from the disc, the voice of the user, the very slight difference between the Magnavox anti-noise and the ordinary "solid-back" transmitter, as recorded with the lips at the normal talking distance of an eighth of an inch from the former, is far more than offset by the freedom of the line from disturbance and the uninterrupted transmission of speech.

While the use of both ears, as with the Type B-2 Magnavox anti-noise telephone, is essential to perfect service under severe noise conditions, there are cases without number where, owing to annoying noises of no extraordinary volume or intensity, no telephone of types placed on the market before the invention of the Magnavox anti-noise transmitter could be used; and yet where a simpler, handier form of Magnavox telephone will answer the requirements.

Therefore, the single-receiver anti-noise instrument was developed. Its reception thus far has proved that the underlying reasons for its development were sound ones.

It is a singular fact that the unoccupied ear of a person using a telephone, save under the most violent noise conditions, is, as it were, subconsciously "cut out" of the circuit. The best test of the truth of that statement is to try it out, under some noisy conditions, with a telephone.

Normally a person uses the left ear when telephoning. Habit and custom have done much to establish this. Left-handed persons reverse the process, but they are in the minority.

Magnavox Desk Set Telephone.

Long established habit in the use of one ear, in telephoning, has in a way had the effect of making the normally unused ear (to use the term coined for Magnavox apparatus) "anti-noise" itself.

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PROMPT SERVICE

Forty-seven distributing houses, and the one nearest you is equipped to render prompt service in supplying whatever you need in the electrical line.

This service is possible because the Western Electric Company maintains complete stocks of Line Material, Motors, Sunbeam Mazda Lamps, Wire, Tools, Blue Bell Batteries and everything electrical.

For prompt service consult the Western Electric House nearest you.

EVERYTHING ELECTRICAL

Western Electric

This phenomenon, if it may be so termed, has permitted the development of the single-receiver Magnavox anti-noise telephone—an instrument which, save under such intense noise conditions as make the double-receiver instrument (Type B-2) necessary to good service, yields results that will astonish the most skeptical.

The Magnavox single-receiver instrument is on the market in two forms—as a complete desk instrument of the "cradle" type (more familiar as yet in Europe than America), and as a hand set only.

The former, designated as Type B-1 anti-noise desk telephone, is complete, and self-contained, embodying the switch-hook in convenient and graceful form. The latter, designated as Type HB-1 anti-noise hand set, is merely the transmitter and receiver of the desk telephone, with a four-conductor cord that permits its adaptation to any telephone circuit whatsoever, existing or projected.

There are innumerable places where the Magnavox Types B-1 or B-2 anti-noise telephones will pay dividends in the form of conservation of time and nerve energy.

The telephone that was impervious to the noise of four giant Liberty motors on the U. S. Navy's "N-C" transatlantic planes will not fail amid the noise in a boiler factory or a knitting mill.

The racket of riveting hammers in a shipyard, or on a steel-frame building outside your office window, has no effect whatever on it.

A stamp mill in full blast is no place for an ordinary telephone, but a Magnavox anti-noise instrument will work perfectly there.

Other places where it will earn a welcome are: Newspaper composing rooms and press rooms, knitting and spinning mills, machine shops, pipe works, garages, sawmills and planing mills, shingle plants, locomotive works, cotton gins, railroad yards, steam or electric, foundries, power plants and gas works, blast furnace plants, and sheet metal works. These will suggest others.

If noise conditions are worse than anything named, Magnavox telephones will overcome them.

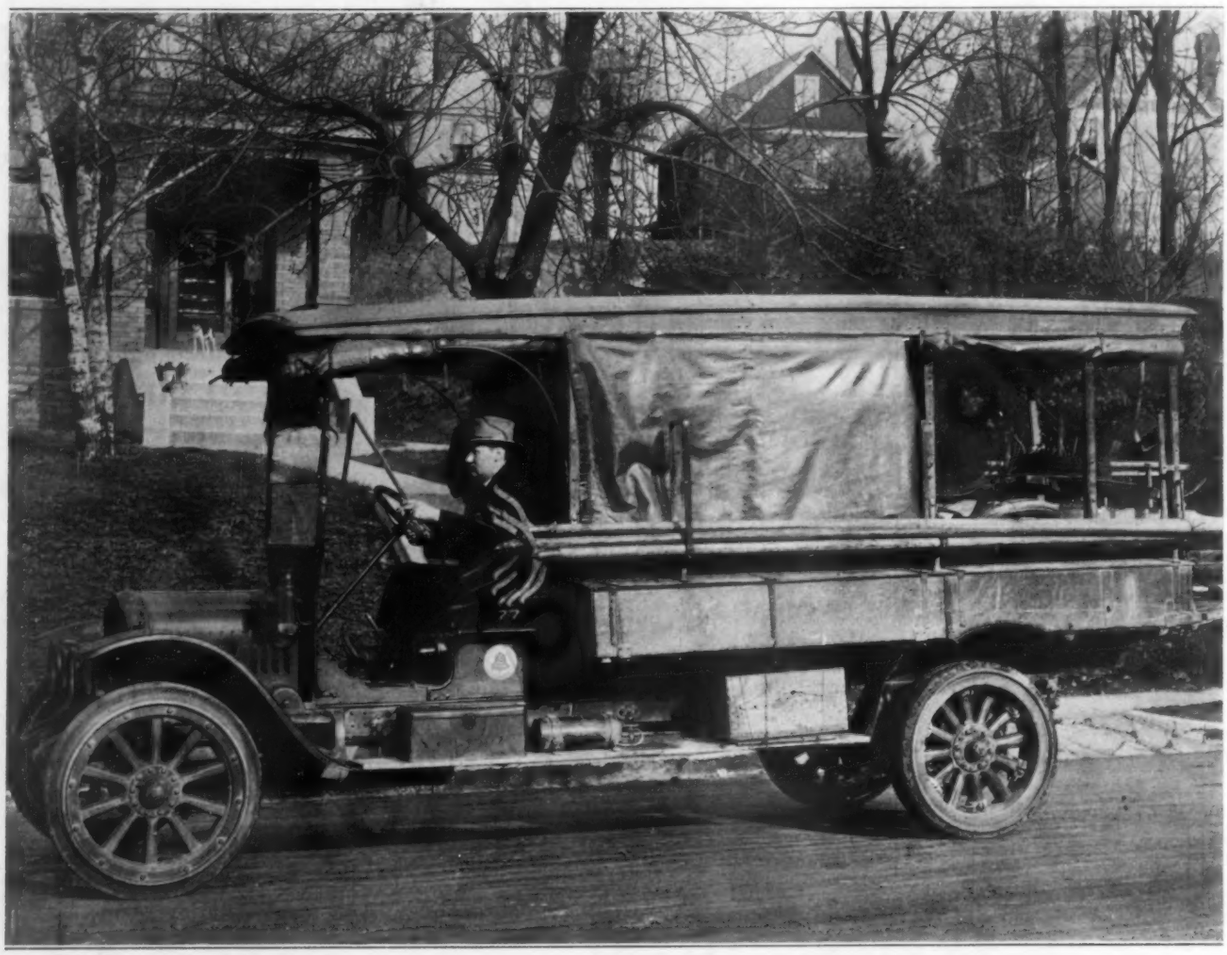
Maintaining a Telephone System

In the lexicon of the telephone company official, "motor trucks" and "service" are synonymous.

The Cincinnati and Suburban Telephone Company, of Cincinnati, O., has found its fleet of fifteen White motor trucks indispensable in building and maintaining efficiency throughout its system.

Throughout an area of some 2,000 square miles, including Cincinnati proper and the city's suburbs, the C. & S. Co.'s trucks roll along on their mission of service. The trucks average thirty-five miles a day. During 1919 the entire fleet averaged 285 days in service.

The fleet includes three-fourth-



One and One-half Ton White Truck, Cincinnati & Suburban Bell Telephone Company.

The Passing of the Wood Telephone Cabinet

Magneto Steel Wall Telephone Type No. 315.

We manufacture and sell many wood cabinet telephones, but—wood suitable for the manufacture of telephone cabinets is practically exhausted—will soon be impossible to buy at any price. Steel cabinets must eventually be used. Why not begin now to use the **Federal** Steel Telephones? Lower in price, higher in quality.

Federal Telephone & Telegraph Co.
Buffalo, New York

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McRoy-Camp Vitrified Salt Glazed Conduits have a smooth interior surface, are durable, impervious to water, have low electric conductivity and afford an effective resistance to the extreme heat caused by an electric arc. We aim to carry a large stock at all times of every size and style, single and multiple. Write for literature.

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No. 46 Cradle Set

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No. 46 Telephone

No. 17 Hand Set

Makes Telephoning a Pleasure and Convenience

Use One Hand Only for Holding Light Weight Hand Set.

Transmitter is always in right position for talking. Supply your subscribers with these up-to-date sets.

No. 17 Hand Set makes an attractive and practical instrument for extension telephone or for use in place of standard transmitter and receiver on wall phone.

Full Information and Prices Upon Request

MANUFACTURER

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State and 64th Sts. CHICAGO, U. S. A.

ton, two-ton, 3 three and one-half-ton and five-ton units. The two-ton trucks carry equipment and men for big maintenance jobs. The three and five-ton models, equipped with power-driven winches, are used for loading, unloading and setting poles, as well as transporting them, and for pulling underground and aerial cable. A three-fourth-ton truck is used to transport supplies to the kitchens of fourteen restaurants operated by the company for its employes.

Christmas Campaign for Hot Shot Batteries

During November and December the National Carbon Company of Cleveland, Ohio, will carry on a campaign featuring Columbia Hot Shot batteries for use at Christmas. This is based on the need for a dependable source of current for Christmas tree lighting and for the operation of electric toys and novelties. The Hot Shot is a simple single battery of from four to twelve cellpower, and combines portability and safety with longer life. Connections are easily made, as there are but two terminals, so that children will have no difficulty in using it correctly. Its high power and freedom from attachment to house wiring give the Hot Shot definite advantages for Christmas tree lighting and toy running.

Educational Advantages To Its Personnel

The opportunity to pursue part-time post-graduate studies at Columbia University has been offered recently by the Western Electric Company to the members of its engineering department. Twelve employes will be selected to study for the degree of Master of Arts. These will be in addition to the other educational advantages which were started by the big telephone manufacturers at Columbia last Fall.

Candidates for the new course must be employes who hold the degrees of Bachelor of Arts, Bachelor of Science, Bachelor of Philosophy, or an equivalent degree in engineering based on a four-year course of study in an institution whose academic standing is approved by the faculty of Columbia. The minimum academic preparation must include a year's course in calculus, a year's course in general physics and laboratory work, and a year's study in mechanics, optics, heat, electricity or equivalent engineering subjects.

The selection of the candidates will be based on evidence of their present attainments and the promise they have displayed in scientific work. Due regard will be given to the prospective ability of the candidate to employ further training to advantage in his duties with the Western Electric Company. Aspirants whose applications are not granted now may apply for future vacancies at Columbia.

The working hours in the offices and laboratories of the Western Electric Company will be adjusted to permit attendance at all the regular exercises of the university.

MacRae's Blue Book for 1920

The latest edition of this buying guide has just come from the press. It is a book of 2,000 pages containing the names of 35,000 leading manufacturers, showing in many cases the location of branch offices. It gives an alphabetical index of trade names of materials as well as the manufacturer's name. There are 14,000 classifications of material and supplies, as well as miscellaneous data, such as weights, measures and tables. The book gives a bird's-eye view of the entire industrial field.

Church Installs Telephones for Deaf

A telephone system from the pulpit to the pews which will be preserved for deaf persons is the novel idea originated by the Broadway Baptist Church of Knoxville, one of the largest Baptist churches in Tennessee. The system will be installed before the remodeled auditorium is opened.

It will consist of a large receiver, placed under the altar in front of the minister, and raised high enough to catch his words. From the receiver will radiate many telephone wires which will all end in one or more of the pews for the deaf. In the pews will be installed a miniature switchboard. The trumpets, which will be equipped with devices used by deaf persons will be connected with the switchboard, but will be detachable. At the time of each service they will be lpaced in the pews to be occupied by the deaf persons exclusively. When song service begins, or the sermon, each will attach his trumpet receiver to the switchboard and will be able to hear distinctly the music or the words of the discourse.

At the end of each service the trumpets will be detached by the users and left on a receptacle or hook provided, and will be taken care of by the church.

A Plea for the Hello Girl

A plea for the telephone operator, joined with a request for a more sympathetic understanding of her work and the difficulties under which she labors, was made recently at Baltimore by Earl Godwin, of Washington, assistant to the president of the Chesapeake and Potomac Telephone Company.

The speaker pointed out that the operators were of a superior type of womanhood, and their mental ability much above the average. He insisted they were as fine a group of young ladies as could be met with anywhere in Baltimore. "The same reasons which would induce one to refrain from cussing out one's stenographer should be equally applicable to the hello girl," he said. Aside from the chivalric aspects of the situation, however, Mr. Godwin pointed out that unkindness and rough speech operated only to the detriment of the service, and could avail nothing. He cited in proof an instance which occurred during the war, when the service deteriorated because of an inrush of new operators. These inexperienced girls naturally gave poor service at the beginning, much to the exasperation of the community, which openly voiced its disapproval. In consequence of this unfriendly attitude there was a general migration of all operators, experienced and inexperienced, to other and more congenial employments. The result was the almost total crippling of service.

MAGNAVOX ANTI-NOISE DESK TELEPHONES

A "close-up" of the Magnavox anti-noise desk telephone, Type B-1. The receiver moves freely on a spring ball joint. The anti-noise transmitter is adjustable in the mounting sleeve.

GIVE

Absolute Elimination of Side Tone and all Outside Noise.

Because of Anti-Noise Transmitter.

In the noisiest shops or offices the voice alone comes through clear as a bell. By its construction nothing else can affect the diaphragm.

We will be pleased to supply further information and quote prices on any quantity for immediate shipment.

The Magnavox Company : : Oakland, California

Statement of the ownership, management, circulation, etc., required by the act of Congress of August 24, 1912, of TELEPHONE ENGINEER, published monthly, at Chicago, Ill., for October 1, 1920.

State of Illinois, County of Cook, ss.

Before me, a Notary Public in and for the State and County aforesaid, personally appeared H. B. McMeal, who having been duly sworn according to law, deposes and says that he is the Business Manager of TELEPHONE ENGINEER, and that the following is, to the best of his knowledge and belief, a true statement of the ownership and management of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443. Postal Laws and Regulations, printed on the reverse of this form to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher, THE TELEPHONE ENGINEER COMPANY, ...1614 Monadnock Bldg., Chicago
Editor, H. B. McMEAL.....53 W. Jackson Blvd., Chicago
Managing Editor, H. B. McMEAL..53 W. Jackson Blvd., Chicago

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock).

H. B. McMEAL.....53 W. Jackson Blvd., Chicago
J. M. GRAFFIS.....53 W. Jackson Blvd., Chicago
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I. B. LIPSON.....105 Monroe St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders, owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: There are no bonds, mortgages, or other securities outstanding against TELEPHONE ENGINEER.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain, not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee, or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who not appear upon the books of the company as trustee, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other persons, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

TELEPHONE ENGINEER CO., H. B. McMEAL, President.

Sworn to and subscribed before me this 9th day of October, 1920. EDW. FAY WILSON.

(SEAL) My commission expires December 24, 1922.

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We, therefore, will have for sale, the following equipment and will appreciate an offer from you for the entire amount or any portion thereof.

6—Sections, 3 positions each and one single position square of American Electric Common Battery Switchboard equipped with (2460) answering lines, multiple jacks, (90) cord circuits and auxiliary apparatus complete with cabling.
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1—Set Ringing Machines.
36—100 pair Sterling Heat Coil and Carbon Terminal Heads, and a large amount of auxiliary equipment.

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NOTICE

All telephone men who are interested in using in their home newspapers the cuts which appeared in the last issue of Telephone Engineer, in connection with an article by B. J. Griswold, on "How Best to Conduct a Newspaper Campaign in the Interest of Telephony," should communicate directly with Mr. Griswold, Hardy-Griswold Company, Fort Wayne, Indiana. Many telephone companies are using these illustrations in a series of advertisements which were prepared originally for the Home Telephone and Telegraph Company, of Fort Wayne.

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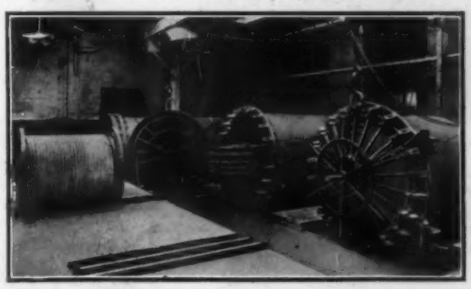
ECCO Dependable Telephone **WIRE**

Watch here for our Monthly Picture



No. 4 Vulcanizing

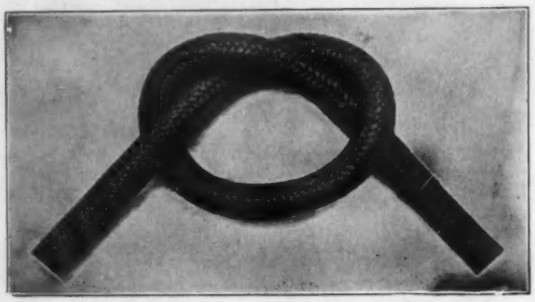
ECCO telephone wire has its rubber insulation vulcanized by means of the apparatus shown above. After the compound has been applied as illustrated in our last advertisement, the wire is baked at a certain temperature for a definite period.

This process imparts toughness, elasticity and durability to the insulation.

Manufactured by
ELECTRIC CABLE COMPANY
YONKERS, NEW YORK

SIMPLEX HARD SERVICE CABLE

FOR PORTABLE TOOLS AND LIGHTS



Flexible as a lamp cord. Protected by a seine twine braid specially treated to withstand rough use. Recommended for portable tools and lights in machine shops, garages, shipyards and on any engineering or construction work where conditions are severe and continuous service is essential.

Send for descriptive circular No. 9.

SIMPLEX WIRE & CABLE Co
MANUFACTURERS
201 DEVONSHIRE ST. BOSTON
CHICAGO SAN FRANCISCO

Telephone Wire

Ask your Lineman, **"the man who knows,"** the kind of wire best adapted for perpetual, satisfactory service. He will say

Muncie Wire

if he has ever seen, tried and tested it.

Before purchasing your next supply get our samples; test and compare, we may save you a costly mistake.
Muncie Wire is handled by most representative Jobbers and Supply Houses.

INDIANA STEEL & WIRE COMPANY
MUNCIE, - INDIANA

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WANTED—Manager and maintenance man for Magneto Exchange of 1,100 subscribers. Plant in good condition and located in Central Ohio. Send photograph and references in first letter. Applicant must be intelligent, honest, and industrious. Address 1111, care Telephone Engineer, Chicago.

CLASSIFIED ADVERTISING

Rates for advertising under this heading 10 cents per word. Minimum charge, $2.00. No limit to number of words.

Rebuilt Equipment.

¶**"REBUILT" TELEPHONE APPARATUS** and exchange equipment saves you 30 to 50 per cent without sacrificing quality or efficiency.

¶**SWITCHBOARDS** — Telephones — Apparatus—Protection Equipment—Cable—Everything you need for the installation and operation of a complete exchange — Magneto or Central Energy—of the best and most reputable manufacturers.

¶**Nine years' successful operation of** our rebuilt equipment department puts it past the experimental stage. Quality and price will make you a permanent customer. Better investigate.

Bargain Bulletin No. 78 Free
Address
"REBUILT" EQUIPMENT DEPARTMENT
Premier Electric Company
1800-4 Grace St. Chicago, Ill.

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Johns-Manville Fibre Underground Conduit.
Moulded Insulations.
Ebony and Transite Asbestos Wood.
Line Materials.
Friction Tapes.
"Noark" N. E. C. Approved Fuses.
"Noark" Renewable Fuses.
"Noark" Cutout Bases.
"Noark" Service and Meter Devices.
"Noark" Subway and Service Boxes.
"Noark" Transformer Boxes.

H. W. Johns-Manville Co.
New York City.
10 Factories — Branches in 64 Large Cities.

WANTED—Manager for Automatic Telephone Exchange of 10,000 subscribers. Plant located in growing community and in good condition. Send photograph and references in first letter. Must be intelligent, honest and industrious. Address 1112, care Telephone Engineer, Chicago.

WANTED—Manager for Automatic Telephone Exchange of 5,000 subscribers. Plant located in growing community and in good condition. Send photograph and references in first letter. Must be intelligent, honest and industrious. Address 1114, care Telephone Engineer, Chicago.

NEW YORK INSULATED WIRE CO.

RUBBER-INSULATED TELEPHONE WIRES

GRIMSHAW and COMPETITION TAPES

CEDAR POLES

Wire or write us for delivered prices
NATIONAL POLE CO., Escanaba, Mich.
220 Broadway, New York
2844 Summit Street, Toledo, Ohio
Rialto Building, San Francisco

BUSINESS
Large and Small

WHEN it was necessary four years ago to go into the open markets and purchase materials at unheard-of prices—when the War Department required the entire output of enormous factories, it was common knowledge that quality was more important than price.

Despite the opportunities for purchase in the established markets, **BUSINESS, LARGE AND SMALL,** finds it equally as convenient and vastly more economical to purchase from the War Department.

The quality that then satisfied the best engineering and production brains in the country predominates in this sale of Electrical Equipment now offered to the business men of the country on a Fixed Price basis.

Other firms have found through careful inspection and investigation that every item offered has satisfied their high and long established standards of quality.

It is obvious that no manufacturer can be too big—his standards of quality too high—nor can any manufacturer, regardless of his size, afford to ignore this extraordinary sale.

SURPLUS PROPERTY BRANCH

Office of the Quartermaster General
WAR DEPARTMENT
Munitions Building **WASHINGTON, D. C.**

WIRE—Quantity 541,277 ft. Type No. 14 B. & S. H. D.—Tw. pr. Fixed price per M. ft., $13.92. Located at Army Reserve Depot, New Cumberland, Pa. Order through New York City. S. P. D. No. 2229.

WIRE—Quantity 26,060,430 ft. Type O. D. T. P. No. 17B and copper clad. Fixed price per mile, $54,304. Located at Army Reserve Depot, New Cumberland, Pa. Order through New York City, S. P. D. No. 2230.

WIRE—Quantity 100,000 ft. Type house, No. 19.—Tw. pr. 36 miles for inside wiring purposes, used principally for telephone work. Rubber covered, single braided, olive green with red and green tracers. Fixed price, $9.68 per M. ft. Location, Philadelphia, Pa. Order through New York City. S. P. D. No. 13586.

WIRE—Quantity 100,000 ft. Type house, 36 miles, tw. pr., soft copper, each conductor A-26 (new). Insulated with rubber compound and cotton braid. Coils packed in boxes. Fixed price, $9.68 per M. ft. Location, Fontana Whse., Fort Mason, Calif. Order through San Francisco, Cal. S. P. D. No. 13587.

WIRE—Quantity 100,000 ft. Type house, 36 miles, tw. pr. Used for interior house wiring, rubber insulation, cotton covered, slate colored with red dots. Fixed price, $9.68 per M. ft. Location, Signal Se., Army Base, Brooklyn, N. Y. Order through New York City. S. P. D. No. 13588.

CABLE—Quantity 1,000,560 ft. Type lead covered telephone, 10 pr. No. 22 ga. Fixed price, $60.32 per M. ft. Location, New Cumberland, Pa. Order through New York City. S. P. D. No. 3550.

CABLE—Quantity 47,520 ft. Type lead covered, 10 pr., No. 22 ga. Fixed price, $60.32 per M. ft. Location, New Cumberland, Pa. Order through New York City. S. P. D. No. 3550.

CABLE—Quantity 79,200 ft. Type lead covered telephone, 10 pr., No. 22 ga. Fixed price, $60.32 per M. ft. Location, New Cumberland, Pa. Order through New York City, S. P. D. No. 3550.

CABLE—Quantity 311,520 ft. Type 15 pr. lead covered, No. 22 ga. Fixed price, $73.25 per M. ft. Location, New Cumberland, Pa. Order through New York City. S. P. D. No. 3550.

REELS—Quantity 1,599. Type wood barrow (payout). Fixed price, $5.60 each. Located at Chicago, Ill. Order through Chicago, Ill. S. P. D. No. 969. These reels were manufactured by M. Kline & Co., Chicago, Ill.

In ordering, address the Depot Quartermaster at the addresses given below, and mention M. & E. M. List No. 12, giving the S. P. D. number of the commodity desired.

Information on other interesting items may also be had upon inquiry at these addresses.

Boston, Mass.
Army Supply Base.

New York, N. Y.
261 Eighth Avenue.

Atlanta, Ga.
Transportation Bldg.

Chicago, Ill.
1819 West 39th Street.

San Antonio, Texas.
San Antonio, Texas.

San Francisco, Calif.
Fort Mason.

DISCOUNTS

Sales amounting to $100,000 to $250,000.....10%
Sales amounting to 250,001 to 350,000.....15%
Sales amounting to 350,001 to 450,000.....20%
Sales on entire remaining balance in one sale 25%
Sales on entire quantity of Linemen's tool belts and wooden barrow reels.....10%

OWNERS' FAITH
in
WHITE TRUCKS

THE following list of large investments in White fleets shows the faith large truck owners have in White equipment.

2 owners have invested over	**$2,000,000**		
4 owners have invested between	**1,000,000**	**and**	**$2,000,000**
5 owners have invested between	**500,000**	**and**	**1,000,000**
22 owners have invested between	**250,000**	**and**	**500,000**
82 owners have invested between	**100,000**	**and**	**250,000**

Experienced truck users *know* truck value in terms of earning power, through actual performance of one truck against another.

They *know* that White Trucks do the most work for the least money, and they back that knowledge by increasing their investments year after year.

The purchaser of one or a few trucks can safely follow their example.

THE WHITE COMPANY
CLEVELAND